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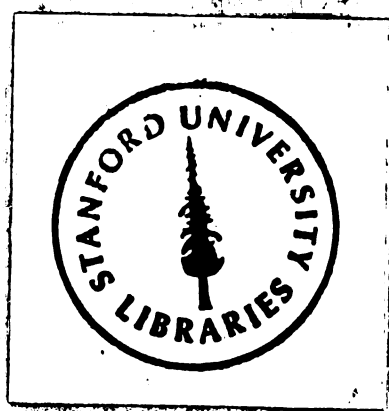
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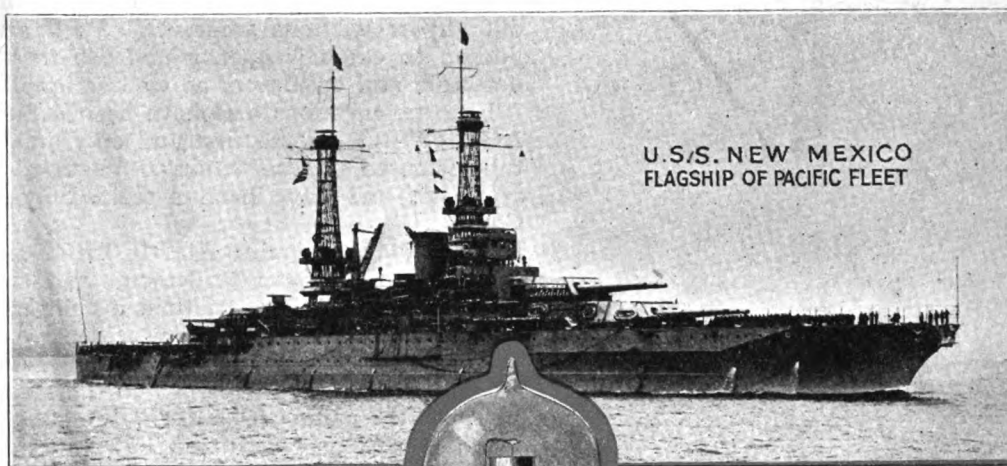


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PACIFIC RADIO NEWS

*Pioneer Journal of
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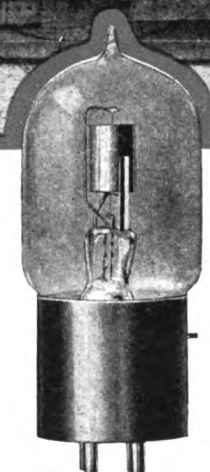


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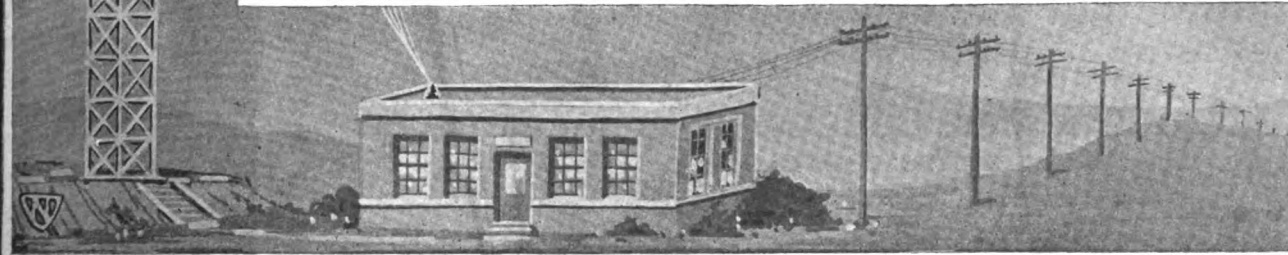
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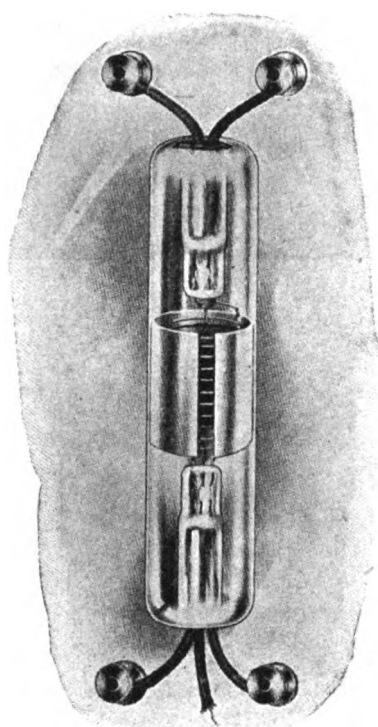
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PACIFIC RADIO NEWS

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BY THE EDITOR
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OUR APPRECIATION

IN our last issue we asked you to fill in a questionnaire and mail it to us in order that we may know your particular wants in the line of reading matter for the big numbers of "Pacific Radio News." As we go to press the questionnaires are still coming through the mail, and the answers to the questions asked are many and varied.

Judging from returns received to date it is safe to assume that the majority of our readers are under 21 years of age; only a small percentage hold commercial licenses and the average reader is a high-school student whose ambition lies in the direction of securing a commercial license. He does not desire to

make radio his life-long study. Highly technical articles do not appeal to him but on the other hand a certain amount of semi-technical information is desired. Current radio news is asked for by all, and the time-worn proverb, "A little jester now and then, is cherished by the best of men," holds particularly true in the case of our readers. Good radio humor is hard to obtain but we are going to do our best to give you a little of it in every issue.

Constructional articles are wanted by many readers. This field has already been well covered but it has been brought to our attention that many amateur radio mechanics have been dissat-

isfied with results obtained from apparatus that was built in accordance with directions found in radio periodicals. With this fact in mind we are hereby assuring you that all apparatus described in our "How-to-make-it" department will accomplish all that the writer of the article claims.

We extend our thanks to those who have sent us the filled in questionnaire, and bearing in mind the nature of material that is asked for by our readers we will strive to give you, at all times, the best that is to be had for publication on the particular subjects that are in such high demand.

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARD

ONE of the largest radio stations on the Pacific Coast will be built at Portland by the Federal Telegraph Co. to replace the former station of this company at Lents, Oregon, which was dismantled during the war.

The towers for the new station will be 600 feet in height and will support an umbrella aerial that will be used to transmit and receive three messages on the same aerial at one time. Most of the apparatus that was originally used at Lents was shipped to Siberia by the Navy Department during the war.

MR. L. Krumm, radio inspector at New York, in a circular letter states that hereafter applicants for licenses at New York will be required to give a thorough demonstration of their sending ability. They will be required to send 500 words, made up of all characters in the alphabet. Their transmitting will also be recorded on tape. Similar action will be taken by the San Francisco radio inspector as soon as the necessary equipment for recording the sending of the applicant is received from the east.

A PUBLIC demonstration of the wireless telephone equipment installed on Catalano Island will mark the inauguration of radio communication between the island and the mainland. The demonstration will consist of wireless telephone communication with Chicago, San Francisco and other points on the continent. The service is expected to be in operation July 1st, and is said to be the first commercial enterprise of its kind in the world. The rate for a three minute conversation between Avalon and Los Angeles will be forty cents.

MR. Dubilier, manufacturer of the Dubilier transmitting and protective condensers bearing his name, was formerly a Seattle amateur. His condensers have become the standard in radio work.

LEE De Forest, the well-known American scientist, according to the New York press, has petitioned to have his alimony payments to his former wife broken off, declaring that her new husband is wealthy and that she is in no need of alimony.

THE Pacific Radio Supplies Company of San Francisco, distributors of the A-P tubes, are supplying a chart of twelve vacuum tube circuits with every tube sold.

BECAUSE of the shortage of enlisted personnel at Eureka, Farallone Islands, Point Arguello, Avalon and Point Loma radio compass stations shipping interests were requested to use the other six stations during daylight hours.

The appeal was made by District Communication Superintendent, S. D. McCaughey. San Francisco mariners are arriving here from the Atlantic report inability to get bearings from any of the compass control stations which have been reported as operating on the Atlantic Coast. The captain of the "West Helix" reported that he was compelled to proceed by soundings, while approaching New York harbor in a heavy fog, because none of the compass stations responded to the radio calls of the ship.

A strike of marine radio operators was declared on June 15th by the Association of Wireless Telegraphists of London, England. The men demand an increase of wages approximately 180 per cent. over the pre-war salary. Ship operators were instructed to cease work upon arrival in port. Shore station operators were not affected by the strike. The minimum salary demanded by the association from the Marconi Company is two pounds and sixteen shillings weekly. 4,500 operators were affected. The strike was called off on June 23rd after guarantees of fair treatment were secured by the strike leaders.

THE use of radio telegraphy as a means of gaining rapid communication between different police stations in the United States, will be installed generally throughout the country in the near future, Chief of Police August Vollmer, of Berkeley, Cal., announced recently upon his return from the national convention of chiefs of police at Detroit, Michigan.

MR. W. H. WARREN, of Ashbury Park has invented a wireless telephone for seashore rolling chairs, so that the patrons of the vehicles can listen to the music transmitted by nearby radio stations.

RADIO experimenters and commercial radio men in the east speak very highly of Lieut. E. W. Stone's book, "Elements of Radio Telegraphy." Not since Prof. Pierce's "Principles of Wireless Telegraphy" have we had such a fine treatise on this subject. Eastern sales are heavy.

A RADIO compass for airplanes, which will enable them to locate other planes accurately, regardless of weather conditions, has been successfully tested by the navy flyers.

On a recent trip from Philadelphia to Pensacola, the NC3 and another from the Anacostia, D. C. field, were equipped with the new device. Communication and bearings were successfully established. The two planes were directed toward each other from the field until, when 65 miles apart, the compass of each was brought into operation and confirmed their positions.

MADAM Nellie Melba, the opera singer, sang several songs into a microphone at the Marconi works in London and telegrams were received from Paris, The Hague and other cities, reporting that the songs were heard there very clearly.

THE Kilbourne & Clark Manufacturing Company has recently undergone an entire reorganization and has actively resumed operations under new management. The company is continuing the manufacture of its well-known wireless apparatus, and also has in hand a large contract for amplifiers for the United States Navy. In addition, special attention is being paid to transformers and motor-generators for radio purposes.

H. F. Jefferson, formerly acting chief engineer of the company, has been appointed general manager. He has had extensive experience in the electrical industry, both in Europe and America, and is a member of several international engineering organizations.

Service work on vessels equipped with Kilbourne & Clark wireless apparatus will continue to be handled as before by the Ship Owners Radio Service, Inc., a subsidiary organization of the Kilbourne & Clark Manufacturing Co.

The California district, with headquarters in the Fife Bldg., is under the management of N. R. Kuhn, formerly of the Communication Service, United States Navy, who has been with the firm since the first of the year.

THE Independent Wireless Telegraph Co., Inc., will soon have on the market a 2 K.W. undamped wave set, according to reports received here.

ME. Marconi, mother of the radio inventor died recently at Bologna, Italy.

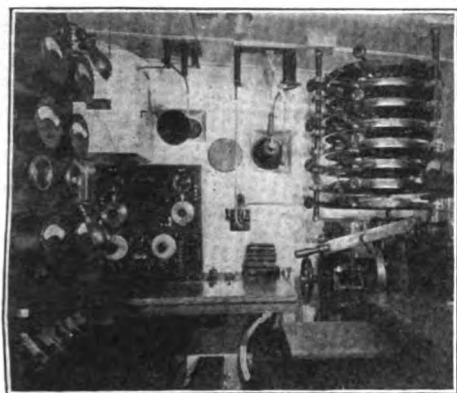


Figure 1.

THE destroyers built for the United States Navy during the war are exceptionally well equipped with radio apparatus. To the casual observer, these small fighting craft appear to be of too little importance to have anything but a very modest and simple radio installation, and it is often with surprise that uniformed people, although familiar with radio apparatus and equipment, learn of the elaborate sets installed on our destroyers.

The accompanying views show the general lay-out of the main radio room as arranged on the average destroyer. Figure 1 is a general view of the control panel, receivers and main transmitter. This transmitter, which can be seen at the right hand side of the figure, is a five kilowatt, 500 cycle transmitter, equipped with a wave changer and load coils, which allow the set to be quickly changed to any of the standard navy wave-lengths. Nine wave are usually provided each of which may be easily obtained by a simple throw of the wave changer switch. The control wheel for this switch can be seen at the end of the center table, below the left hand side of the antenna load coils. To the extreme right can be seen the radiation ammeter, a Western thermocouple type, connected in the earth lead. The condensers are located beneath the primary and secondary of the inductive coupler and consist of a bank of standard Dubilier mica units. The power transformer is located beneath the table. The motor generator is located in the dynamo room and is operated entirely by the control board seen to the extreme right of the picture. This machine is operated by a solenoid controlled automatic starter, but in case of emergency it may also be operated by hand.

The receiving equipment can be seen just to the right of the power control board. It consists of a Navy Standard short wave receiver (200 to 3,000 meters), and a long wave receiver with a range of from 2,500 to 15,000 meters. The audion control panel and two-step amplifier are located to the left of the

The Radio Equipment of a U. S. Destroyer

power panel, as can be partly seen behind the shade on the pilot lamp on the power panel. Standard Western Electric head telephones are plugged into the two jacks, visible just under the edge of the table in front of the tuners. A multi-pole switch enables the use of the audion on either receiving cabinet.

Two antennae are used with the equipment, one being the main antenna, used for the main set, and the other, an auxiliary antenna, is used only for the telephone set. A ground switch for the main antenna can be seen near the top of the picture. The smaller switch to the left is the telephone antenna grounding switch.

The radio telephone equipment is shown in Figure 2. This is a standard navy type telephone set, which uses one VT2 oscillator tube and another tube as a modulator. The central panel houses the entire sending and receiving apparatus, together with a two-step amplifier. The small panel to the left is used for the dynamotor control for supplying a voltage of 350 to the plate circuit. This telephone is operated entirely by a 30-volt storage battery which is independent of the ship's main power system. The box in the foreground to the right, is a three-step audio frequency amplifier which operates the loud speaker in the pilot house. The loud speaker is arranged in such a manner that the Commander of the vessel can stand in the pilot house and converse directly with the Commanders of other vessels by radio telephone without leaving his post.

A microphone transmitter is located in the pilot house which directly controls the modulation or control circuit of the set. A simple push button is provided in the pilot house to operate the send-receive relay, located inside of the main panel. Using the loud speaker it is not, as can easily be seen, necessary for the Commander to leave his post, or to wear head telephones; it is only necessary for him to depress or release the control button which operates the send-receive control relay, located within the set itself. The operator on watch is required to listen-in at the same time and attend to all tuning, adjustments, etc., which may be necessary. The radiation of the telephone set is usually in the neighborhood of from 0.65 to 0.7 amperes and the normal

transmitting range is ten miles, although distances of over a hundred miles have been covered at times. The radiation of the main spark transmitter is about 38 amperes on 950 meters, but due to the small, low antenna the signals do not carry very well.

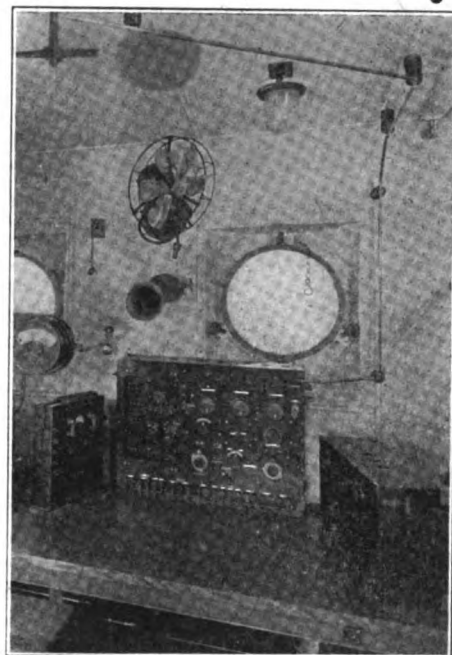


Figure 2

The complement of the regular destroyer's crew calls for three radio men; one chief electrician and two assistants. A continuous watch is maintained at all times while the vessel is under way. Radio operators who enlist in the navy at the present time, will if they so desire, be assigned to a destroyer which is equipped with a set similar to the one herein described.

John R. Wakeman, a member of the U. S. S. "Birmingham" was married recently by wireless. His bride in Detroit went to the church with her wedding party. The minister read the wedding ceremony and it was wirelessly to the "Birmingham." The crew of the cruiser stood at attention on the deck with Wakeman out in front while the messages were read.

If you have something that you don't need and want to sell, use the Classified Advertising columns of "Pacific Radio News."

The First Lecture by Radiophone

On June 29, 1920, at 8:00 p. m., the first lecture ever given over the radio telephone was delivered by Lieutenant Ellery W. Stone, U. S. Navy, General Manager of the Pacific Radio Supplies Co., from the radio station of the De Forest Radio Telephone and Telegraph Co. at the California Theatre, San Francisco.

Considerable interest was aroused in radio circles over Lieutenant Stone's speech particularly from the fact that it was the first time in the history of the radio art that a lecture by radio had ever been made. Operators for several hundred miles reported receiving the talk clearly and distinctly, and the students at several radio schools listened in as part of their instruction.

Lieutenant Stone was introduced to his "audience" by Mr. C. V. Logwood, chief engineer of the De Forest Co., who spoke as follows:

"As we have announced for the past week, we shall now have a lecture by Lieutenant Ellery W. Stone, U. S. Navy, general manager of the Pacific Radio Supplies Co., distributors for the Moorhead Laboratories of San Francisco. Lieutenant Stone is a member of the Institute of Radio Engineers, the U. S. Naval Institute and the American Institute of Electrical Engineers, and is the author of a book and many papers on radiotelegraphy?"

Following this introduction, Lieutenant Stone spoke for about fifteen minutes as follows:



LIEUT. ELLERY W. STONE

GOOD evening, gentlemen, this is Ellery W. Stone speaking. I can assure you that it affords me a great deal of pleasure to address you tonight in what is probably the first lecture ever delivered over the radio telephone, and in so doing, I must express my thanks to the DeForest Co. and to the management of the California Theatre who have accorded me this privilege.

I shall take this opportunity to say a few words on the subject of vacuum tube operation for the benefit of those operators, experimental, commercial and naval, who may be using them in their receiving sets. While the theory of vacuum tubes is, of course, quite thoroughly understood, it has occurred to me that a few points on the actual operation or adjustment of vacuum tubes for most efficient results might be of interest.

You will of course appreciate the fact that without charts or diagrams, it is somewhat difficult to present any sort of a talk.

I shall endeavor to make the talk as clear as possible considering the limitations of the conditions under which I am speaking.

Vacuum tubes may roughly be divided into two classes, hard and soft. By a hard tube, or amplifier-oscillator, we mean one in which there is no trace of gas left in the tube, insofar, of course, as it is humanly possible to so exhaust it. A soft tube, or detector, on the other hand, is one in which a small trace of some gas is deliberately retained in the tubes. This gas may be air, composed largely of oxygen and nitrogen, or

traces of mercury vapor, or some of the rarer gases such as argon, neon or helium. Commercially, however, such gas as is present in soft tubes is usually air, nitrogen, or mercury vapor.

Soft tubes are used for detector purposes while hard tubes are used for amplification and the generation of oscillations. Hard tubes should be used, therefore, for regenerative work and amplifying work in a receiver and for oscillation work for transmitting purposes in an undamped wave telephone or telegraph set.

As you all know, the principle on which a hard tube works is that of the pure electron discharge radiated from the heated filament while with the soft tube, the electrons radiated from the filament break up the molecules of gas purposely left within the tube into positive and negative ions. In addition to the radiated electrons themselves, these positive and negative ions separated from the original molecules through their collision with the radiated electrons also serve as the carriers of the plate current, which is the current made audible in the telephone receivers.

You are familiar with the characteristic curve of vacuum tubes in which the plate current is plotted against different grid potentials, the potential of the grid being measured with respect to the negative side of the filament. However, in order that this action may be visualized, I would suggest that you draw a curve as follows. Take a pencil and draw to the right a horizontal line about a half inch long. Now curve this line upwards until it is almost straight up and down or vertical for a distance

of two inches. Now curve this line a half inch to the right again until it is practically horizontal. The ordinates or vertical components of this curve are plate current, the abscissae or horizontal measurements are grid potential. The grid potential half way up the curve is zero, to the left it is negative and to the right it is positive. This curve is approximately the characteristic curve of the vacuum tube. From this curve it will be observed that for very minute changes in the grid potential, this potential is that of the incoming radio wave, very large values of the plate current, relatively speaking, may be triggered through the telephone receiver. The vacuum tube thus acts as a sort of relay, the radio potential being used to relay the energy supplied by the B battery through the telephone receivers. As another analogy, we may cite the trigger effect of a pistol. The relatively light pressure of the finger on the trigger, corresponding to the radio wave potential on the grid, serves to release the chemical energy stored in the powder charge of the cartridge, the latter corresponding of course to the electrical energy of the B battery.

Referring again to the characteristic curve of the average vacuum tube, the sensitivity of any one tube depends upon the steepness of this curve, for the steeper the curve, the more B battery energy will be released for a given change in grid potential, that is to say—for a given strength of received radio current.

In a soft tube, the steepness of this curve depends upon the potential ap-
(Continued on page 8)

The Construction of an Ideal Amateur Short Wave Regenerative Receiver

By A. F. Pendleton*

ALTHOUGH the vacuum tube is almost universally used as a detector, oscillator or amplifier in receiving circuits by amateurs, there seems to be a general lack of knowledge in obtaining the maximum results with this most valuable instrument. The intention of this article will be to describe accurately the construction of a moderately priced receiving tuner wherein the maximum efficiency is secured, with the use of one vacuum tube, on signals of 200 meter wave length.

In the first place it is essential that the receiver be a set designed for receiving 200 meter waves, or thereabouts, only. The 200 to 3,000 meter tuner

ANOTHER REGENERATIVE RECEIVER WILL BE DESCRIBED IN OUR NEXT ISSUE BY MR. T. LAMBERT, MANAGER OF THE RADIO SHOP, SAN JOSE, CAL. COMPLETE SPECIFICATIONS AND WORKING DRAWINGS WILL ACCOMPANY THE ARTICLE.

may be shunted with a small condenser and the grid variometer may be removed. In place of the plate variometer a small coil shunted by a variable condenser may be used.

In regard to the sizes of the various instruments, the variable condensers 1 and 2 should be of approximately .001 mfd. capacity, which is usually one hav-

22 plates) shunted across secondary 4. Variometer 6 may be replaced by a coil of No. 22 D. C. C. wire wound on a 3 inch tube, 30 turns, no taps, and by shunting an .0005 mfd. condenser across this coil. The variometer is much better, however.

In making the loose coupler it is not necessary to adhere to the sizes of cardboard tubes as given above. A tube from 4 to 5 inches in diameter will be just as good but the same size wire should be used as specified. In order to find the correct amount of wire or, in other words the right number of turns, wind the tube with a number of turns of wire, say forty or fifty turns, winding

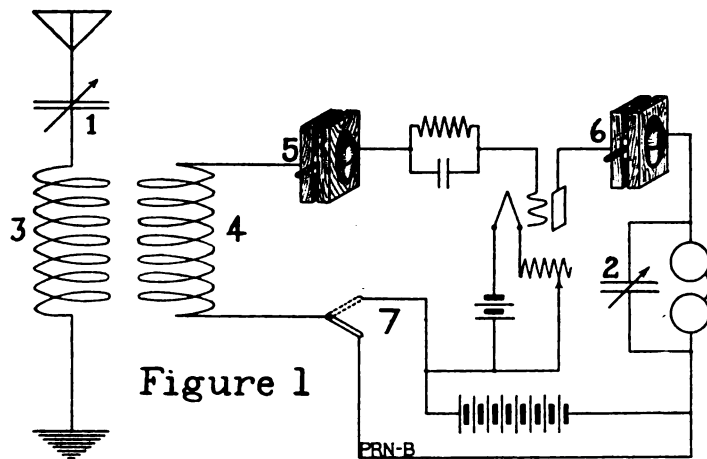


Figure 1

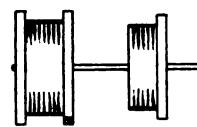


Figure 2

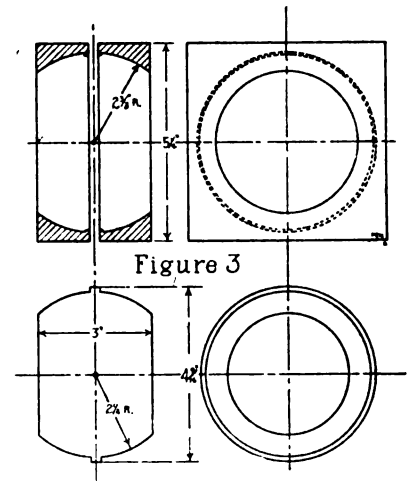


Figure 3

must be placed in the discard, with its faulty switches and dead ended turns.

The receiver described herein is positively the most sensitive short wave receiver now known. This statement is made because it has stood the test in competition with the most expensive products of the foremost makers for the past five years.

The cost of construction rests to a great extent with the builder. If the apparatus is to be housed in a polished hardwood case with a bakelite panel, the cost will run up, but if, on the other hand, it is not housed the cost should not run as high as fifteen dollars. If the amateur possesses some of the necessary instruments already the receiver can be made for even less money.

Figure 1 shows the hook-up used. The following instruments are shown: Three variable condensers, small loose coupler, two variometers, two-point switch, grid leak, vacuum tube, phones and necessary battery. Almost equally good results may be obtained by certain substitutions from this number of instruments. For instance, the secondary of the coupler

ing about 43 plates or more. The primary of the loose coupler 3 may be wound on a $3\frac{1}{2}$ inch tube 2 inches long and with 32 turns of No. 20 or 22 D. C. C. Magnet Wire. No taps need be taken off. Secondary 4 is a 3 inch tube $1\frac{1}{2}$ inches long wound with 35 turns of No. 28 or 30 D. C. C. wire; no taps being taken. Figure 2 shows a good way to make the loose coupler, but any method may be used that suits the builder. Figure 3 shows the dimensions of variometer 5. The rotor is wound with 70 turns of No. 22 D. C. C. The stator is also wound with 70 turns of the same size wire. Variometer 6 is made to the same size as variometer 5 but the rotor instead is wound with 50 turns of No. 18 D. C. C. wire and the stator with the same number of turns of the same size wire as the rotor.

Switch 7 is for changing the relation of the B battery to the circuit. It is found very helpful to cause the circuit to oscillate at times when the bulb seems obstinate.

To substitute instruments, variometer 5 may be done away with and a small condenser of .0005 mfd. capacity (about

the secondary tube with an equal amount of wire approximately. Then connect up the set according to the hookup. Listen in for a station that is operating on exactly 200 meters. The variable condenser in the primary circuit should be at about one-third full scale reading. If it is over this, cut out turns of wire on the primary coil; if the condenser reading is under a third of the scale reading add wire to the coil until just right. On the secondary add or take off turns until 200 meter signals come in loudest with about five degrees deflection of the secondary condenser. Use as little wire as is possible in the secondary. Greatest efficiency is obtained when the secondary turns are cut down until minimum amount are used on 200 meters with zero scale deflection of the secondary condenser. When such a minimum is reached it will be found that the secondary may be pulled out a considerable distance without the signals fading appreciably. This condition makes for success in eliminating interference.

As can be seen from the above description (Continued on page 18)

*Manager, Radio Phone Shop.

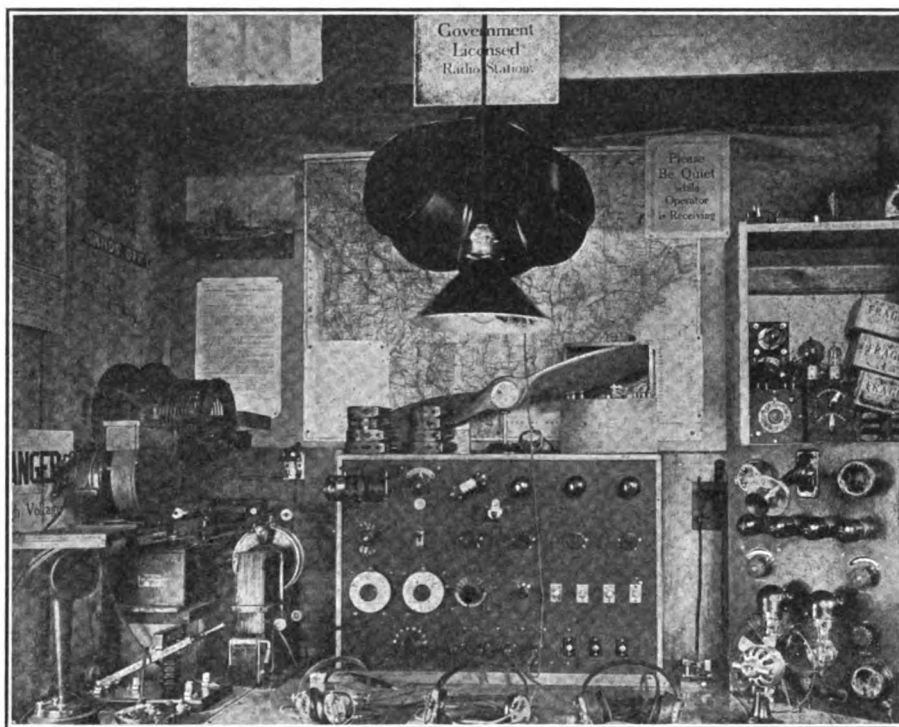
Amateur Radio Station of Hugh and Harold Robinson (2QR)

THE accompanying half-tone of the radio station, owned and operated by Hugh and Harold Robinson of Keyport, New Jersey, is a splendid example of amateur radio development. The call of the station is 2QR and a distance of 1,100 miles has been covered by the spark transmitter.

The receiving equipment consists of a three-stage amplifier, long and short wave honeycomb inductances and vacuum tube detector. The amplifier is wired with copper tubing, one-eighth inch in diameter, and all joints are soldered.

The transmitting equipment is composed of a 1 K.W. Thordarson transformer, International oscillation transformer, Dubilier 200 meter special condenser and a Clapp-Eastham rotary gap.

The receiving aerial is 60 feet high consisting of three stranded bronze wires 160 feet in length, spaced three feet apart. The transmitting aerial is 60 feet high, consisting of six stranded bronze wires 60 feet long, spaced two feet apart. The normal transmitting radiation is four amperes. A DeForest Type "O" radiophone set has also been installed and has covered a distance of 90 miles without difficulty.



GOING UP!

ON July first the publishers of all magazines must pay a higher rate to the postal authorities for second class matter sent through the mails. Another increase in mailing rates becomes effective in 1921. The cost of paper and printing have also taken several pronounced jumps of late, and no relief is at present in sight. We are therefore compelled to increase the price of "Pacific Radio News" to 20 cents per copy, beginning with the September number. With the increase in size of the magazine our expenses are increased and in order to give you a bigger and better "Pacific Radio News" it becomes necessary to increase the price.

In the past, every issue has had a fair turnover, but we can honestly say that every cent of our surplus has been put into the issue that followed. It is our desire to add more pages to the coming issues and to give you the best that money can buy. The September number will sell for 20 cents a copy on the news-stands and the subscription rate will be increased to \$2.00 per year. All subscriptions received before July 20th will be accepted at the present rate of \$1.50 and all subscribers on our present mailing list may extend their subscription for a term of not longer than three years at the rate of \$1.50 per year. This also applies to prospective subscribers.

THE RIGHT KIND OF TRANSFORMER OIL

By R. Waller

Castor Oil is an ideal insulating medium for transformer primary and secondary insulation, provided that all trace of water is removed from the oil. Water is the sole enemy of perfect insulation. Castor oil, if bought from your local druggist, usually contains a certain amount of water. The substance will appear thick and opaque, but by shaking and allowing it to settle the water will separate from the oil.

Traces of water are likely to be present in the oil even though it is impossible to detect it. In order to remove the water from the oil add a few lumps of unslaked lime and shake the oil container. The lime will combine with the water and, after settling, the water-free oil can be poured off. The most effective method of separation is obtained by placing a small piece of metallic sodium, about the size of a marble, in the oil and shaking well. Sodium can be procured from your druggist. Care should be exercised in handling as it will cause burns.

HOW TO SOLDER SMALL WIRES

When soldering small wires never use acid or paste. A flux made of resin, dissolved in alcohol, is the best thing to use.

A cote of homing pigeons, trained by H. P. Brown of Aberdeen, Washington, will furnish a connecting link between the radio station at Westport and Aberdeen. The Westport station is now under construction and will be completed in about 60 days.

The pigeons will carry the messages in a small aluminum capsule tied to the leg, and the arrival of each bird will be announced by the ringing of an electric bell.

Our next issue will contain the first of a series of articles on arc transmitters. The new Federal arc will replace spark transmitters on many vessels in the near future, and for this reason the arc series should prove of considerable interest to all commercial radio men.

Ensign J. B. Dow, U. S. N., covers the subject in a non-technical manner. The series will be illustrated with many diagrams and half-tones.

To remove the enamel (Cellulose Acetate) covering from wire, dip the parts to be bared into a mixture of the following:

Ammonia	1 part
Acetone	1 part
Alcohol	1 part
Benzol	1 part

The liquids should be kept in separate bottles and mixed as needed. They will decompose if left exposed to the air.

Radio Club News

RADIOPHONE FOR SAN FRANCISCO RADIO CLUB

Through the courtesy of the Leo J. Meyberg Company, the DeForest Radio Tel. and Tel. Co., will install an amateur radiophone in the club rooms of the local radio organization. Mr. R. M. Klein, manager of the Pacific Coast branch, will supervise the installation of the equipment and will give a demonstration of the apparatus.

The radiophone will be used for experimental purposes as well as for announcing meetings and spreading "club propaganda."

MEETINGS SUSPENDED

The Bay Counties Radio Club has decided to adjourn until August 27th. A large number of members find it impossible to attend the meetings until the vacation season is over.

U. R. T. A. OF S. F. JOINS NATIONAL U. R. T. A.

Beginning July first the United Radio Telegraphers' Association, located at 24 California street, San Francisco, Cal., will operate under charter issued by the National United Radio Telegraphers' Association of New York City. The latter association is the national organization of all radio operators sailing on American vessels and it is composed of seven branch offices located in the principal seaport cities of the U. S. The action of the Pacific Coast radio men has completed the combining of radio operators employed on ships flying the American flag. Offices have been established in Boston, New York, Philadelphia, Baltimore, Norfolk, New Orleans, Cleveland and San Francisco. Additional offices will soon be opened in Chicago and Seattle.

MAXIM SPEAKS AT RADIO CLUB

Hiram Percy Maxim, president of the American Radio Relay League, was a recent visitor in San Francisco. Members of the San Francisco Radio Club, Inc., were favored by an interesting address on the history of the A. R. R. L.

RADIO COMPASS STATIONS TO BE TESTED

Experiments with the radio compass stations on the Pacific Coast will be made during the month of July. Circulars have been sent to all steamship companies requesting that they instruct the captains of vessels to try out the new method of reckoning. Complete service will not be established for some time due to the shortage of operators.

Extend your subscription for another year and take advantage of the present low subscription rate.

Radio Club Directory

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., 355 Presidio Ave., San Francisco, Calif. Meetings every Tuesday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary, 355 Presidio Avenue.

The Bay Counties Radio Club. Meetings held every Friday evening at 354 Perry St., Oakland. Special Notice: Meetings suspended for summer months. Next meeting to be held on August 27th. Monthly dues 50c. Age limit 16 years. Visitors welcome. Address communications to the secretary, 354 Perry street, Oakland. —adv.

SIXTH DISTRICT AMATEUR STATIONS—Continued.

6UN	F. Arnberger	1354 Grove st.	Alameda, Cal.
6UO	C. B. Newcombe	Main st.	Yerington, Nevada.
6UP	A. E. Harris	200 E. Santa Barbara st.	Los Angeles, Cal.
6UQ	C. E. Thompson	1896 15th st.	San Francisco, Cal.
6UR	R. Maxsen	827 Turk st.	San Francisco, Cal.
6US	L. E. Rice	1214 E. Sonora st.	Stockton, Cal.
6UT	E. Blom	525 Pacific st.	Alameda, Cal.
6UU	G. Gabinet	90 Naples st.	San Francisco, Cal.
6UV	A. F. Pendleton	1246 California st.	San Francisco, Cal.
6UW	L. Farwell	Broadway st.	Los Gatos, Cal.
6UX	A. Phillips	1333A Stevenson st.	San Francisco, Cal.
6UY	H. L. Wirth	3757 Dalton ave.	Los Angeles, Cal.
6UZ	T. A. Fisher	573 Scott st.	San Francisco, Cal.
6VA	J. M. Glesner	(Portable station)	Berkeley, Cal.
6VB	E. Anderson	1371 6th ave.	San Francisco, Cal.
6VC	M. Umbriaco	2528 Market st.	Oakland, Cal.
6VD	H. B. Drake	5830 Colby st.	Oakland, Cal.
6VE	E. Kluss	414 Moss ave.	Oakland, Cal.
6VF	L. Gianninni	561 Brussels st.	San Francisco, Cal.
6VG	S. Peterson	1424 Grove st.	San Francisco, Cal.
6VH	H. J. McCoy	1305 Arch st.	Berkeley, Cal.
6VI	D. M. Whirle		Oakland, Cal.
6VJ	Boy Scouts' Camp		Del Mar, Cal.
6VK	D. O'Brien		Oakland, Cal.
6VL	Boy Scouts Headquarters		San Diego, Cal.
6VM	P. Parsons	633 Middlefield road	Palo Alto, Cal.
6VN	C. L. Johnson	2104 Prince st.	Berkeley, Cal.
6VO	H. C. Crawford	800 S. Central ave.	Glendale, Cal.
6VP	F. G. Davis	610 Fillmore st.	San Francisco, Cal.
6VQ	L. McMahon	911 Rand st.	Sacramento, Cal.
6VR	J. W. Babcock	R. F. D. No. 58	Wrights, Cal.
6VS	J. C. Chez, Jr.	818 24th st.	Ogden, Utah.
6VT	W. Thompson	6th and Los Robles ave.	Puente, Cal.
6VU	A. M. Knox	7245 Franklin st.	Hollywood, Cal.
6VV	L. Kilgore	1482 W. 45th st.	Los Angeles, Cal.
6VW	B. Rosenberg	240 Richland ave.	San Francisco, Cal.
6VX	A. A. Hunt	122 Market st.	Los Gatos, Cal.
6VY	T. E. Stimson, Jr.	4533 Marmion Way	Los Angeles, Cal.
6VZ	C. Burrows	103 W. Pleasant st.	Santa Paula, Cal.
6WA	T. F. Blackburn	1719 Gardner st.	Los Angeles, Cal.
6WB	G. Barnes	725 N. 4th st.	Reno, Nevada
6WC	R. Barrow	7618 Hollywood blvd.	Los Angeles, Cal.
6WD	A. H. Hart	90 Surfside st.	Santa Cruz, Cal.
6WE	R. Dobson	957 Ellen ave.	Los Angeles, Cal.
6WF	G. Harrison	7 Cabrillo st.	Stanford University, Cal.
6WG	W. Honsinger	1412 10th st.	Sacramento, Cal.
6WH	R. Ward	170 Arlington ave.	Pasadena, Cal.
6WI	G. Albee	1241 W. 40th Place	Los Angeles, Cal.
6WJ	G. Beurgingnon	198 Johnson ave.	Santa Clara, Cal.
6WK	L. Feldt	2044 India st.	San Diego, Cal.
6WL	C. Muncy	2226 Grove st.	Berkeley, Cal.
6WM	F. Ellert	325 E. St. James st.	San Jose, Cal.
6WN	B. Alexander	4340 Cleveland ave.	San Diego, Cal.
6WO	A. G. Leech	5665 San Pablo ave.	Oakland, Cal.
6WP	H. J. Irthum	1882 54th st.	Oakland, Cal.
6WQ	G. Murray	1437 Hyde st.	San Francisco, Cal.
6WR	A. Khazoyan	484 S. Los Robles ave.	Pasadena, Cal.
6WS	C. Whalen	163 Sa. Pac. Bldg.	Huntington Park, Cal.
6WT	C. Sutherland	340 Moran st.	Reno, Nevada
6WU	C. Richardson	406 W. 28th st.	Los Angeles, Cal.
6WV	J. L. Roberts	3450 Iowa st.	Fresno, Cal.

THE FIRST LECTURE BY RADIO-PHONE

(Continued from page 4)

plied to the plate and the degree of ionization present within the tube. Under our present conception of electronic radiation from a filament, we believe that the heat generated within the metal due to the passage of the electrical current imparts such tremendous activity to the electrons contained within the metal that they cannot be restrained and are driven off into space. If we surround the filament wire with gas under atmospheric pressure, this pressure will tend to restrain the electrons so that they cannot leave the wire. On the other hand, as we pump out the tube, the diminishing gas pressure makes it very easy for the electrons to leave. The higher the vacuum, that is to say, the lower the pressure on the wall of the filament, the more electrons will be radiated for a given filament temperature.

As we exhaust the tube, however, we are removing molecules of air from the enclosed space so that there will be fewer molecules left to be broken up into positive and negative ions by the filament. If the filament were sawed off and the wire for maximum ionization, which depends on bombardment of the electrons. Thus upon maximum electron radiation coupled with a maximum number of molecules to be broken up, we must obtain a happy medium between these two opposing actions. If we pump the tube too much, we shall have plenty of electrons radiated but not enough gas molecules to be broken up. On the other hand, if we do not exhaust the tube enough, we shall have plenty of gas molecules present to be ionized but not enough electrons radiated to bring such ionization about. The difficulty in detector or soft tube manufacture, therefore, is to obtain that exact pressure which will give maximum ionization. At the laboratories of the Pacific Radio Supplies Co., we have been able by very careful manufacture, to obtain this exact gas pressure, and in our new detector tube, the Electron Relay, have brought out a detector for the reception of spark signals or radio telephone speech which we believe cannot be equaled.

The soft tube has a disadvantage, however, which makes it impracticable for amplifier work. While the detector curve is very steep due to the ionization effect and is hence a very efficient amplifier of the rectified current charge built up on the grid, the curve has a very low saturation point. The saturation current is the upper flat portion of the curve. That is to say, if too much potential be applied to the plate, the increased velocity of the electrons completely ionizes the gas, the familiar blue glow manifests itself and a fluctuation in the grid potential produces no effect

in the plate current. For amplifier work, therefore, it becomes necessary to pump the tube to a very high vacuum so that there shall be no upper limit to this curve within the operating range of the grid potential, whether the tube be used on the first or last step of a multi-stage amplifier. On the amplifier vacuum tube sold by the Pacific Radio Supplies Co., it is possible to secure tremendous amplification of the grid energy. In order that the curve in a hard tube should be as steep as possible, it is desirable to apply a fairly high potential to the plate so that our VT amplifier-oscillator should be used with a B battery of from 60 to 110 volts.

The generation of oscillations by a vacuum tube is in reality simply an adaption of its amplifying properties. We may connect the plate circuit back into the grid circuit by one or two of three methods. By employing a tickler coil, we secure inductive coupling between these circuits, with a feedback condenser, we secure electrostatic or capacity coupling, and with resistances or variometers we secure conductive coupling and such electrostatic coupling as may be obtained from the close proximity of the tube elements and lead wires.

By connecting the plate circuit back into the grid circuit and by causing an initial fluctuation of the grid potential, as by grounding any of the grid circuit leads with the finger or by throwing the filament into the circuit, this transient variation of the grid potential will be amplified in the plate circuit. This will be fed back into the grid circuit and reamplified in the plate circuit. The whole process repeats itself many times, the final magnitude of the oscillating currents being limited by the tube constants and the operating plate potential. This generation of radio frequency, undamped oscillations thru regeneration, is similar to the howler circuit used on the wire telephone in which a telephone receiver is held a short distance from the transmitter. A sound made in the vicinity of the system will be reamplified back and forth between the receiver and transmitter, the only limit to the sound heard in the receiver being its current carrying capacity and the maximum possible amplitude in which the diaphragm can vibrate.

Hard or amplifier tubes are commonly operated on 6 volts A battery or filament potential and from 60 to 110 volts B battery. Adjustments of filament current and B battery are not critical.

With the detector tube, on the other hand, the necessity for an exact electronic radiation so as to secure maximum ionization with a given gas pressure makes it necessary to have a very fine regulation of the filament rheostat. The plate potential should be varied in steps of not more than 3 or 4 volts but

best operation will be secured when a high resistance potentiometer is connected across part or all of the B battery.

With our electron relay, the filament current should be adjusted to from four to five-tenths of an ampere. This means that the filament will be burning at a little more than red heat. The plate potential varies with different tubes but every effort is made to bring them to a gas pressure such that their best operating point will be with a potential of 35 volts on the plate. Some tubes, however, may run as high as 60 volts. All detector tubes are tested before and after basing so that every detector tube sold by the Pacific Radio Supplies Co. is guaranteed.

No grid leak is necessary with the Electron Relay for the positive ions within the tube, due to the dissociation of the gas molecules by collision, serve to conduct away such negative charge as may remain on the grid and grid condenser at the end of each wave train.

If the filament current or plate potential on the detector tube be too high, a hissing sound will be heard. The filament current should now be slightly reduced, possibly the plate potential as well—the detector will now be adjusted for best results. In adjusting the detector or electron relay, be sure that adjustments are made on weak signals. By running up the plate potential or filament current, signals from nearby stations can be made very loud, but this adjustment will be a very poor one for the reception of distant stations. If the correct adjustment is made for weak signals, strong signals will of course be received with sufficient intensity, whereas if the adjustment be made for loud signals, the weak ones may often be lost.

Gentlemen, I think this will conclude my remarks for the evening, and in closing allow me to thank you for your very kind attention.

RADIO CONVENTION TO BE HELD IN SAN FRANCISCO

During the month of October, 1920, a Pacific Coast Amateur Radio Convention will be held in San Francisco. A committee on arrangements has been appointed by the San Francisco Radio Club, Inc., who will have full charge of the affair. Radio clubs from Seattle to San Diego will be invited to send delegates to the convention and it is proposed to have many prominent radio men in attendance.

Prof. Tinsley, of the Polytechnic High School, has been appointed Chairman of the Committee and he will appreciate communications from those who desire to take an active part in the affair.

One dollar will bring you "Pacific Radio News" for nine months if you send it to us now.

With the - - - Manufacturers

Mr. T. Lambert, manager of the Radio Shop, San Jose, Cal., has a new regenerative receiver ready for the market. The popularity created by the well-known variometer units have prompted the manufacturer to incorporate them in a complete cabinet type receiver. "Beauty goes further than skin deep" in this receiver. Exactness and neatness have been the watchwords throughout. Mr. A. E. Bessey (6BR) has copied Chicago (9ZN) with one of the regenerative units and only two steps of amplification.

Tresco tuners are "putting over" some good work of late. Mr. W. Solinski, of Chicago, Ill., says that his aerial was blown down in a recent storm with nothing but the lead-in remaining. The Tresco tuner was hooked up to the lead-in and signals were received with very good audibility. Other tuners were tried on the same lead-in but no success was had.

Mr. W. A. Vetter, of the Pacific Radio Exchange, has a direction finder, static eliminator, compass coil and indoor aerial ready for the market. He affords the amateur radio man the first opportunity of purchasing an instrument of this character.

The new A. H. Grebe catalogue of experimental and laboratory radio equipment contains a copy of all bulletins issued between February and April, 1920. It is illustrated with many half-tones that do full justice to the well-known line of apparatus that bears the "Grebe Radio" trade-mark.

The Wireless Manufacturing Company of Canton, Ohio, is back in our midst with a rotary gap for amateur use. This is the first that we have heard from Canton for several years. Mr. Henry L. Levy, the manufacturer of the gap, states that it is a dependable instrument, ruggedly constructed. Running at its highest speed, 4,200 R.P.M., a 420 spark per second note is obtained.

The Atlantic Radio Company, Inc., has recently issued a catalog containing 107 pages of information covering a reliable line of goods that they offer to the radio trade.

The Western Radio Electric Company, a Los Angeles concern, is now managed by Mr. L. E. Taufenback, one of the old-timers in the radio game. A complete line of radio apparatus is handled by the Southern company and they have been appointed exclusive

agents for the Grebe product in the Southwest.

Mr. H. Berringer is now with the California Electric Supply Company in charge of the radio department. "6WZ" of the pre-war days will probably be remembered by many Pacific Coast amateurs. Berringer signs "6BJ."

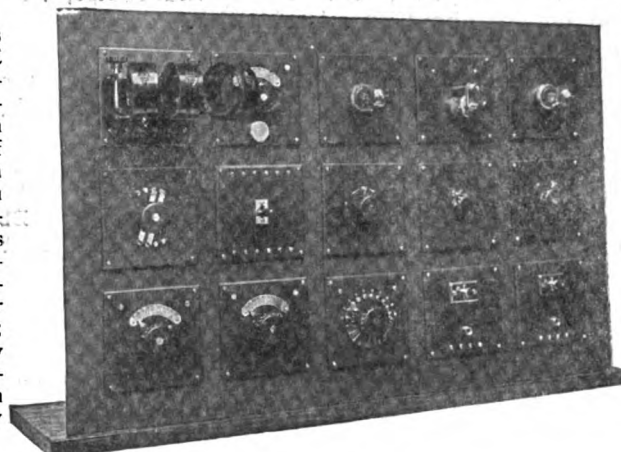
In aviation it's Aviators,
In navigation it's Navigators,
In gladiation it's Gladiators,
So why not call radio men Radiators?

The Spokane Radio Telephone and Telegraph Company has recently been formed by two amateur radio men who will commence an extensive radio business in Spokane, Wash. Radio telephones will be installed in the interior for the use of farmers and to offset the present high cost of the wire service.

Radio club secretaries should write for our attractive subscription offer to club members before our new rate becomes effective.



Picture here shows typical 15-panel DE FOREST Unit Receiving Set consisting of a Tuner with wave length range of 150 to 25,000 meters; a crystal and an audion detector, and a que-step amplifier. This Set is the most complete and efficient receiving apparatus ever put out under \$175.00; its cost is considerably less than that; the entire set of Units shown here totaling only \$162.64.



DE FOREST Unit Receiving Sets

Give You Better Apparatus at Low Cost

DE FOREST Unit Receiving Sets offer the most practical system of securing accurately designed, and highly efficient receiving apparatus without paying for expensive factory assembly and costly cabinets. You buy the individual instruments, each mounted on a panel, and assemble and wire them yourself.

You can start with a few Units giving you a Receiving Set of efficient but simple type, and build up, always fitting new Units into the system as additions to the old. You can even fit these Units into any system you may now have.

For the Amateur, Student or Experimenter, this Unit System is the most instructive because in using your own ingenuity in assembling and wiring the Units you will greatly broaden your Radio knowledge. There are many possible combinations and you should

Send for the De Forest Radio Manual

which describes the Unit System in full and also contains much valuable general Radio material. Send 10 cents for a copy at once.

DeForest Radio Telephone and Telegraph Co.

Inventors and Manufacturers of High Grade Radio Apparatus
1425 SEDGWICK AVENUE NEW YORK CITY

Sole Western Distributors

Lee DeForest, Inc.

Shipments Made From San Francisco Warehouse

451 THIRD ST.



WITHOUT A PEER!

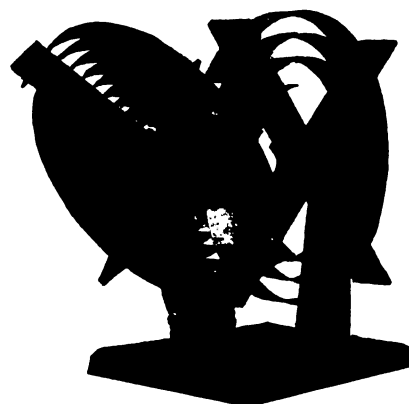
The Wesrad Oscillation Transformer

is introduced to you—not just born—but developed from the ordinary awkward and unhandy contrivance into a graceful, efficient and highly scientific piece of apparatus.

THE WESRAD, designed for 200 meter wave-length and for power up to 1 kilowatt, has the following distinctive specifications which make it superior to any other on the market:

Insulation: Bakelite Dilecto $\frac{1}{4}$ " throughout. **Woodwork, base and arms:** Quartered oak, Standard weathered oak finish. **Primary:** 3 turns of 1-inch heavy brass ribbon. **Secondary:** 8 turns. **Primary inductance,** 4 microhenries. **Secondary** about 10 microhenries.

Extremely rugged in construction, yet compact and light of weight. Can be placed in any position and easily adjusted wherever you put it. Net weight 6 lbs. Shipping weight 9 lbs. Price..\$10.00



WESTERN RADIO ELECTRIC COMPANY

ESTABLISHED

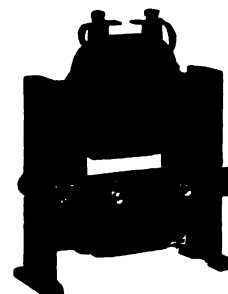
"FOR BETTER SERVICE TO THE WESTERNER"

Immediate Deliveries
Leading Manufacturers Products

512 East Ninth Street,
Los Angeles, Calif.

ACME MEANS HIGHEST

HIGHEST EFFICIENCY
HIGHEST POWER FACTOR
HIGHEST LOAD VOLTAGE
HIGHEST SPARK FREQUENCY
HIGHEST RECORDS



Acme 250

		SPECIFICATIONS					PRICE	
	TYPE	Power Factor	Efficiency	Load Voltage	Spark Frequency	Pri. Current 110 Volts	Fully Mounted	Semi-Mounted
ACME	250	.95	82	8000	700—800	2.4	\$16.00	\$13.00
ACME	500	.95	85	11000	700—800	4.8	22.00	18.00
ACME	1000	.95	90	15000	700—800	9.6	33.00	28.00

Write for Bulletin

CARRIED BY LEADING DEALERS

BREAKS RECORDS

ACME APPARATUS COMPANY

21 WINDSOR STREET,
CAMBRIDGE 39, MASS.

TRANSFORMER AND RADIO ENGINEERS AND MANUFACTURERS

Does this Summertime Atmosphere Bother You?

We all know that our best radio work is done during the winter—on those cold, crispy, dry winter evenings when the ether is as clear as a bell. And we also know—that the summertime is not over-friendly to radio work. The dull and muddled ether, surcharged with atmospheric electricity, is by no means an ideal medium for our radio waves. So it comes right down to a matter of using every ounce that's in our transmitters if we are to maintain any sort of transmitting efficiency. If your transmitter does not satisfy you with it's summertime performance, it's high time that you install a GENUINE DUBILIER CONDENSER.

Type	Watts	Max. Volts	Capacity	Price	Type	Watts	Max. Volts	Capacity	Price
D100	250	10000 v.	.007 mfd.	\$19.00	D110	250	10000 v.	.01 mfd.	\$21.00
D101	500	14000 v.	.007 mfd.	30.00	D111	500	14000 v.	.01 mfd.	35.00
D102	1000	21000 v.	.007 mfd.	45.00	D112	1000	21000 v.	.01 mfd.	50.00
D103	1000	25000 v.	.007 mfd.	50.00	D113	1000	25000 v.	.01 mfd.	55.00

DUBILIER CONDENSERS have gained an enviable reputation for excellence of design, workmanship and materials. To maintain the old prices would have meant a lowering of the Dubilier Standard. Rather than change the quality we have felt incumbent upon us to advance the prices only in so far as was necessary to cover the increased cost of manufacture.

PACENT ELECTRIC COMPANY

(Incorporated)

BUILDERS AND SPECIALISTS IN RADIO, ELECTRICAL AND LABORATORY EQUIPMENT

SALES AGENTS for A. H. Grebe & Co., Dubilier Condenser Co., Electrical Products Mfg. Co., Rawson Electrical Instrument Company, Richter & Byrne, The Magnavox Co., and others

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TELEPHONE BEEKMAN 5810

New York City



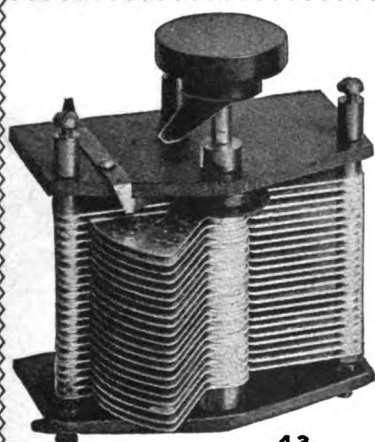
DUCK'S

New Big 200-Page No. 14 Wireless Catalog and 100-Page Electrical Catalog

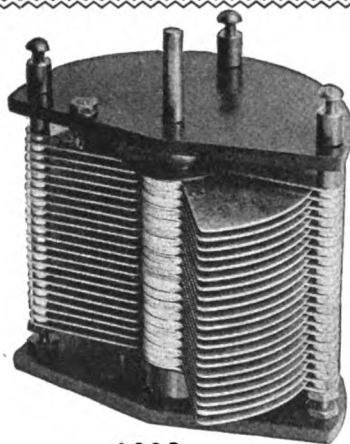
The wireless catalog mailed for 12c and the electrical catalog for 6c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise.

Everything in wireless worth while is listed in this catalog. The experienced amateur will tell you to see our catalog before buying. You are thereby insured against an unwise purchase. It is the Beacon Light to guide you right in the selection of your wireless apparatus. No bigger or better values are obtainable elsewhere.

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio



43



4300

Announcing a New Variable Condenser

Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

REMEMBER—WE ABSOLUTELY GUARANTEE SATISFACTION OR YOUR MONEY BACK.

SERIES "T"			—PRICES—	SERIES "L"		
No. 20	2 plate	VERNIER	\$2.00	No. 2300	23 plate, .00075	\$ 6.00
No. 70	7 "	.0001 m.f.	2.35	No. 4300	43 plate, .0013	8.00
No. 130	13 "	.0002 m.f.	2.75	No. 6300	63 plate, .002	10.00
No. 170	17 "	.0003 m.f.	3.15			
No. 230	23 "	.0005 m.f.	3.60			
No. 310	31 "	.0007 m.f.	4.30			
No. 430	43 "	.001 m.f.	5.25			
No. 630	63 "	.0015 m.f.	7.50			

Include postage for one pound

Either style of condenser fitted with indicating dial at additional cost of 75c.

Include postage for two pounds

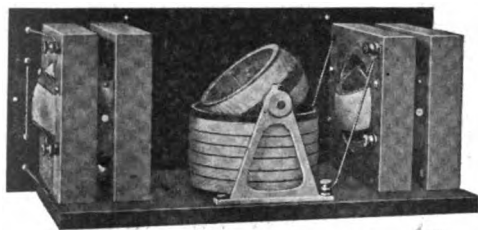
The Wireless Shop

511 W. WASHINGTON STREET

A. J. Edgcomb

LOS ANGELES, CAL.

When writing to Advertisers please mention this Magazine



Back View

General Specifications:—Ball type Variometers and Vario-Coupler (described in detail in the June "QST"). Heavy "bus-bar" wiring with soldered connections. Genuine bakelite panel and dials (not composition). Mahogany cabinet. Range 140 to 500 meters. Shipping weight 15 pounds.

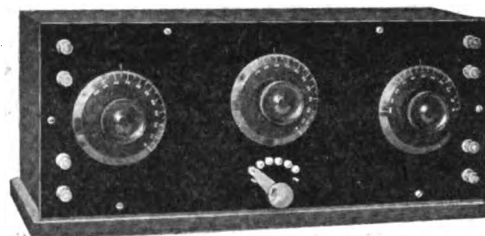
Price.....\$42.50

Variometers and Vario-Couplers identical with those used in the above regenerative receiver.

Variometers	\$10.00
Vario-Couplers	7.00
Bakelite Dial and Knob	1.30
Knob and Pointer .....	.60

Blueprint of instructions sent with set and parts.

IMMEDIATE DELIVERY



Front View

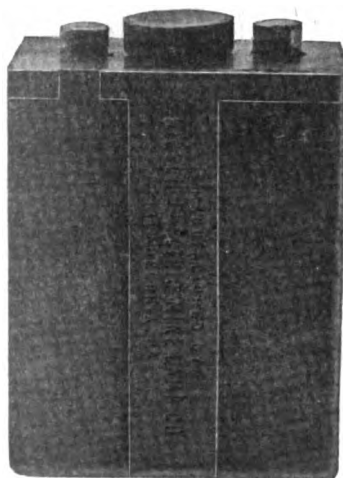
The RADIO SHOP

Sales Offices: Bank of Italy Building
SAN JOSE, CALIF.

Dept. 5

Plant: SUNNYVALE, CALIF.

Storage Batteries For Sale



400 Hirsch Mine Lamp Cells in perfect condition, never been used. Capacity 15 A. H. These cells are in hard rubber containers and are of very rugged construction.

These cells were originally a part of a large Government order and the original quotation was in excess of \$5.00 each.

Three for your filament or twenty for your "B" Battery will solve your

Battery problems for good. Price: Single cells \$1.50. In lots of twenty \$1.35.

Champion Battery Co.

Sales Office 302 Second Ave., North
SEATTLE, WASH.

BINDING POSTS, BOLTS, NUTS,
SCREWS, GEARS, SPROCKETS,
CHAIN, PINION WIRE,
NOVELTIES IN BRASS GOODS,
HARD RUBBER SHEET AND ROD,
VULCANIZED FIBRE SHEET-
ROD-TUBE

TOOLS and SHOP SUPPLIES

BRASS, COPPER, BRONZE,
ALUMINUM, STEEL, NICKEL SILVER

In Sheets, Rods, Tubes and Wire

C. W. MARWEDEL

ESTABLISHED 1872

76 FIRST STREET San Francisco, Cal.

THE "PARADEX"

Increase the efficiency of your De Forest Honey-Comb Coils. Our extension arm, when used in connection with a De Forest Coil Mounting, permits a wide range of coupling than is possible to be obtained with the present mounting and coil.

CONSTRUCTED OF BAKELITE, HIGHLY FINISHED WITH
ACCURATELY MACHINED CONNECTORS

Obtain a set of these extension arm-adapters and secure the benefit of increased selectivity.

\$1.50 each, prepaid. A set of three for primary, secondary and tickler, \$4.00 prepaid.

PACIFIC RADIO EXCHANGE, 431 CALL BLDG., San Francisco

SAVE MONEY

BY TAKING ADVANTAGE OF
OUR SPECIAL COMBINATION
SUBSCRIPTION OFFER.

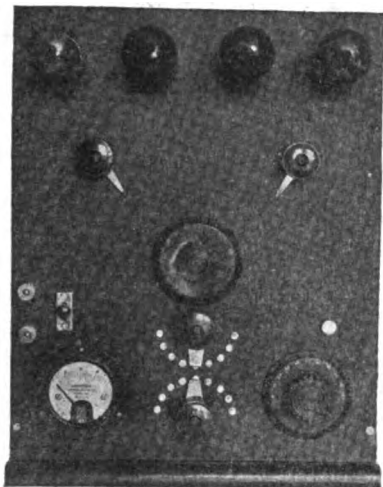
PACIFIC RADIO NEWS
AND Q. S. T.
THIS MONTH ONLY

\$3.00 FOR A YEARLY SUBSCRIPTION TO BOTH

PACIFIC RADIO PUB. CO.,
50 Main St., San Francisco.

When writing to Advertisers please mention this Magazine

Radio Telephone and Telegraph Supplies



Front view of Radio Telephone Panel. Microphone Transmitter not attached. Voice transmission about 25 miles. Parts for complete set (without tubes) \$175.00. With full directions for assembling

A Rectifying Transformer for direct connection to 110 volt, 60 cycle A. C. included.

PARTS SOLD SEPARATELY

"B" Battery Transformer
High and Low Frequency
Choke Coils.
2 M. F. Condensers.
Telephone Transmitters.
Variable Condensers (all makes).
Meters, Etc.

Bakelite Panels cut to any size.
Mission or Mahogany finish
Cabinets built to your specifications.

EVERYTHING FOR THE
— EXPERIMENTER —

MAIL ORDERS ONLY

The Radiophone Shop

255 Golden Gate Avenue
San Francisco, Cal.

Chas. Brown & Sons

871-873 MARKET STREET
SAN FRANCISCO, CALIF.
Phone Sutter 6030

RADIO APPARATUS FOR THE AMATEUR

The Up-Town Radio Store
GIVE US A TRIAL
We're Always Glad to Talk
"WIRELESS"

ON MARKET STREET
Opposite Powell

No Seals—No Secrets— But Service!

There is only one Relay Receiver, the



TYPE CR-3 Relay Receiver



Inspection of the interior of this Receiver reveals design and workmanship fully in keeping with its outward appearance.

The circuits used are thoroughly explained in the instructions and blue prints which accompany each Receiver.

The use of this Receiver is licensed under the original Armstrong and Marconi patents.

The GREBE RADIO guarantee is absolute and unconditional. Each instrument manufactured by us must give satisfactory service. Our interest in the purchaser does not terminate with the sale.

The CR-3 Receiver may be inspected at any of the following progressive dealers:

Barker-Fowler Electric Co., Lansing, Mich.
Continental Radio and Electric Corp., New York
Doubleday-Hill Electric Co., Pittsburgh, Pa.
Holt Electric Utilities Co., Jacksonville, Fla.
Hurlburt-Still Electrical Co., Houston, Texas
Kelly and Phillips, Brooklyn, N. Y.
Manhattan Electrical Supply Co., New York, Chicago, St. Louis
Pacent Electric Co., Inc., New York City
Geo. W. Parezo & Co., Washington, D. C.
F. D. Pitts Co., Inc., Boston, Mass.
Philadelphia School of Wireless Telegraphy, Philadelphia, Pa.
F. S. Katzenbach, Trenton, N. J.
Western Radio Electric Co., Los Angeles, Calif.

A. H. GREBE & CO., Inc., 78 Van Wyck Blvd., Richmond Hill, N. Y.

Pacific Coast Representative Maurice Raphael, 414-5 Walter P. Story Bldg., Los Angeles, California

PACIFIC RADIO SCHOOL ARC AND SPARK SYSTEMS

THE MOST UP-TO-DATE AND EXCLUSIVE RADIO SCHOOL IN THE WEST. LATEST TYPE POULSEN 2 KW ARC TRANSMITTER AND INDEPENDENT TYPE ONE KW 500 CYCLE SPARK SET.

EQUIPMENT IN ACTUAL OPERATION.
NAVY STANDARD RECEIVING SET WITH AUDION AMPLIFIER.

UNDER THE PERSONAL SUPERVISION OF ADDISON S. MCKENZIE, CHIEF ELECTRICIAN, U. S. N. R. F., FORMERLY INSTRUCTOR AT MARE ISLAND NAVY YARD AND W. A. VETTER, FORMERLY CONSTRUCTION FOREMAN FOR THE MARCONI WIRELESS TEL. CO.

INSPECTION INVITED. SEND FOR DESCRIPTIVE CIRCULAR.

433 NEW CALL BUILDING

SAN FRANCISCO

PATENT THAT DEVICE

It may be the foundation of a big business. Trust only Uncle Sam with your idea. His fees are small; pay no others. Full instruction how to get your own patent, including a complete set of application forms and specimen patent for \$2.00. CUTTING PATENT SCHOOL, CAMPBELL, CALIF.

"B" MERACO Batteries

Volts. Standard
22.5 B A-2 type. Postpaid **\$1.20**

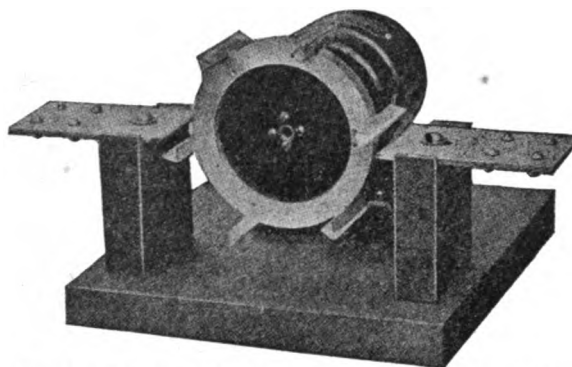
Guaranteed on a money back basis.

Write for free bulletin describing
our other styles

Mercury Radio Appliance Co.

Dept. C-1, 672 Broadway,
Brooklyn, N. Y.

GIVE YOUR SPARK A CHANCE



Our New Rotary allows all of the energy in the closed circuit a free discharge surface. Electrodes are $2\frac{1}{2}$ inches wide and 1-16th inch thick, accurately shaped on a milling machine. Made with 6 or 12 points for high or low note. You can't beat the combination of an Acme transformer and our 12 point rotary. Absolutely highest efficient gap ever offered, fully guaranteed.

PRICED AT \$50.00 WITH EITHER ROTOR
Literature ready for distribution June
first and IMMEDIATE DELIVERIES

Wireless Manufacturing Co. Canton, Ohio

'INSULATE'

"Yours (the General Insulate Company) is the only firm we have bought from in the East in the last year, which has kept ITS PROMISES REGARDING DELIVERIES and given us the Service we need. I consider this wonderful knowing the trouble all you folks in the East have had to get materials, labor, transportation, etc.

You have also given me the squarest deals in all our transactions."

This statement was made to us unsolicited, recently by two of our "Coast" customers from whom we had the pleasure of personal calls at our factory. (Names will be given if interested.)

Nuff sed!!!

General Insulate Co.

1019 Atlantic Ave., Brooklyn, N. Y.

Agents:

F. Steinberger

9 S. Clinton St., Chicago

Insulation Materials Co.,

521 Guardian Bldg.,

Cleveland, Ohio

F. G. Scofield

Kent Bldg., Toronto, Cana.

John T. Rowe

131 Yonville Sq., Montreal,
Canada



BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

233 Broadway, New York City

525 Market St., San Francisco, Cal.

332 S. Michigan Ave., Chicago, Ill.

411 S. Main St., Los Angeles, Cal.

301 Fifth Ave., Pittsburgh, Pa.

Cor. King and Yonge Sts., Toronto, Ontario, Canada

ANYTHING IN—

RADIO APPARATUS

Electric Supply and Repair Co.

Frank P. Herrguth

Al Rosenberg

Formerly of Paul Seiler Electric Works

520 Market Street

San Francisco, Cal.

When writing to Advertisers please mention this Magazine

QST de ACE

LET'S SING

(Tune, Battle Hymn of the Republic)
 Mine ears have heard the signals
 From a dozen different lands
 From Greenland's icy mountains
 To Sahara's burning sands
 From the land of cherry blossoms
 To where Mount Sorata stands.
 And I've learned a thing or two

CHORUS

Q. R. X. I'm going to tell you
 Q. R. X. I'm going to tell you
 Q. R. X. I'm going to tell you
 How you can get them too
 This spasm continued next month.
 Watch our ads., they are "different."
 So are our instruments. It's to our
 mutual advantage to get acquainted.
 "You may pay more, but you can't
 buy better."

Dealers.—If you don't stock Ace
 equipment you are missing a good
 line.

THE PRECISION EQUIPMENT CO.

2437 GILBERT AVE., Dept. F
 Cincinnati, Ohio

KLAUS RADIO COMPANY

Eureka, Ill. Peoria, Ill.

A complete line of Standard
 Radio Telegraph and Telephone
 Equipment for every purpose.

AMATEURS

Send for our monthly bulletins

DEALERS

Write for our trade proposition

Catalog 6c

METEOR ELECTRIC CO.

309 So. Flower St.,
 Los Angeles, Calif.
 MANUFACTURERS & RETAILERS

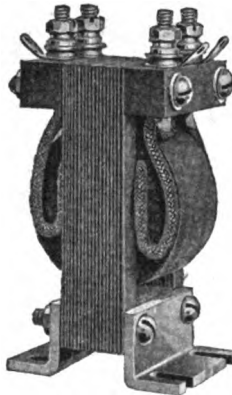
OF

RADIO APPARATUS

Also Parts and Supplies.
 We Have An Exchange Dept.
 Used Apparatus Bought, Sold and
 Exchanged.

You have only a few weeks left in
 which to secure a yearly subscription
 for \$1.50. Next month it will cost you
 \$2.00 to subscribe.

To obtain the very best results use Federal Standard Accessories



No. 226-W—Type A
 Audio Frequency
 Transformer

THEY ARE USED by the leading
 Experimenters, Manufacturers and by
 the Government.

The standard 226-W Audio Frequency
 TRANSFORMER is more popular and
 efficient than any other because it GIVES
 RESULTS. YOU SHOULD USE IT.

Our new Bulletin 102 W-B is now
 ready for mailing. Send 4c in stamps.

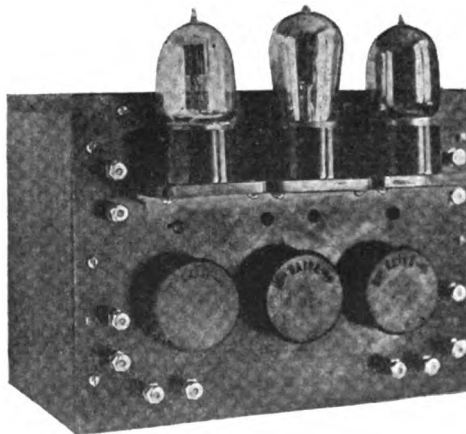
CONTAINS NEW INFORMATION

Our line of Jacks and Federal Duo-
 Lateral Inductances just out.

If your dealer does not have them,
 write the

Federal Telephone and Telegraph Company

1766 Elmwood Ave., Buffalo, N. Y.



Two Stage Amplifier & Detector \$38.00 Prepaid

Complete with "B" Battery, Two
 Amplifying Transformers, Three
 Tube Sockets, Three Rheostats,
 Bakelite Panel, Grid Condenser,
 Hardwood Cabinet and Nicked
 Binding Posts. Ready for use. (No
 tubes furnished). Requires only
 one "A" Battery. Specially priced
 for thirty days. 10 per cent. in-
 crease after August 20th.

Audion Control Panel

Constructed of Bakelite. Completely wired and consists of
 latest model tube socket, filament rheostat, "B" battery switch
 with taps, brackets and nicked binding posts, prepaid..... **\$8.00**

IMMEDIATE DELIVERY. REMITTANCE MUST ACCOMPANY ORDER

RADIO DEVELOPMENT CO.

P. O. Box 2114,

San Francisco, Cal.

Introducing NOSTAT

"Conquerer of Static"

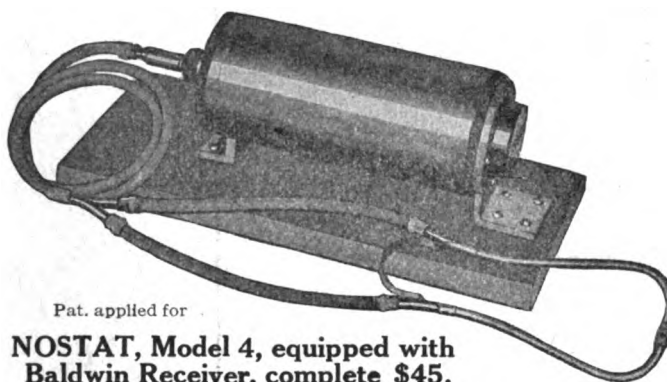
Something entirely new which does acoustically what the most efficient radio set fails to do electrically

---Cuts out Static (QRN)

---Cuts out Interference (QRM)

Involves no freak circuits.

Simply connect NOSTAT in place of your present phones and copy.



Pat. applied for
**NOSTAT, Model 4, equipped with
Baldwin Receiver, complete \$45.**

NOSTAT utilizes an old scientific principle in a modern way and is so simple and effective you will wonder why it was not applied before: it tunes to the tone frequency of the sound produced by the telephone receiver after the usual electrical tuning has been accomplished, thus affording the means for differentiating between the acoustic pitches.

Static tones being of entirely different frequency from those of radio signals, when tuned to respond to one NOSTAT cuts out the other. This is true of radio signals of the same electrical wave length but of different tones.

The only adjustment necessary to cut out static, interference or the compensating wave of the undamped stations is the movement of the cylinder for tuning to the acoustic wave length.

NOSTAT functions equally well on all wave lengths.

The materials and workmanship are scientifically correct. Baldwin mica-diaphragm receivers are supplied.

NOSTAT is sold at present for experimental use only and the present price is subject to advance with increased cost of materials.

NOSTAT may be procured from the following dealers:

Pacent Electric Co., Inc., 150 Nassau St., New York.

Manhattan Electric Supply Co., Inc., New York, Chicago, St. Louis.

Continental Radio & Electric Corp., 6 Warren St., New York, N. Y.

Dealers: An attractive proposition is offered by NOSTAT to progressive dealers—write us.

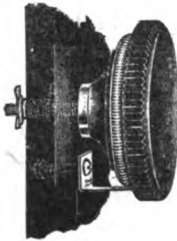
NOSTAT COMPANY



118 St. James Pl., Brooklyn, N. Y.

PARKIN RHEOSTAT

\$1.00 Post paid
WHY PAY MORE?



when this is the
 easiest mounted,
 smoothest running,
 best rheostat on
 the market.

No. 35 Parkin Panel Type Rheostat (Pat. March 30, 1920), has easily renewed resistance unit mounted on back of moulded Bakelite Knob. Shaft is moulded into knob, cannot come loose. "Off" position provided. 360 degree rotation insures fine adjustment. Write for descriptive circular of audion panels, switches, binding posts, contacts, etc.

Dealers: Write for proposition.

PARKIN MFG. CO.
 San Rafael, Calif.

You can now get

RADIO APPARATUS

on the

Installment Plan

Full particulars, including the RVA BULLETIN each month, Loose-Leaf Binder, and Bargain Supplement sent on receipt of ten cents, 1c stamps or coin.

J. Donald Vandercook

P. O. Box 396

LOMBARD, - - ILLINOIS

The Best Combination

OF THEM ALL

\$3.00

FOR A YEARLY SUBSCRIPTION TO

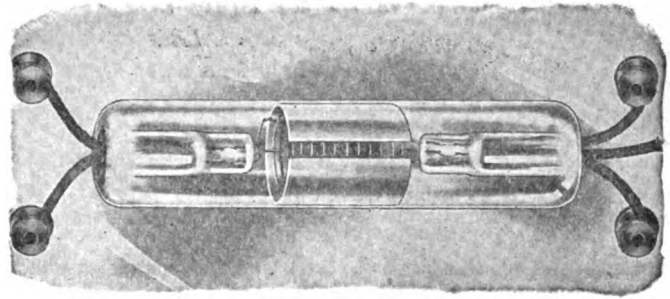
**Pacific Radio News
 and QST.**

SUBSCRIBE TO BOTH

**Your Save 50c by
 Taking Advantage of
 This Offer**

PACIFIC RADIO PUB. CO.

50 Main St., San Francisco, Cal.

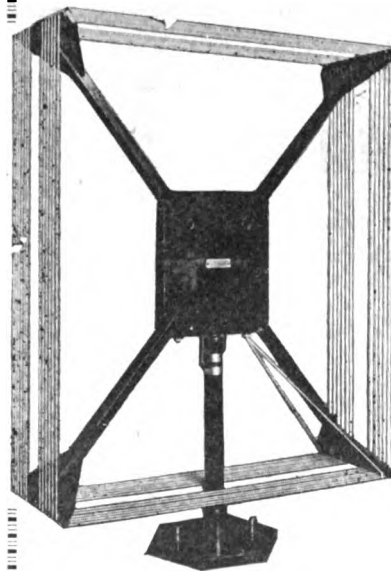
AUDIOTRON THE ORIGINAL TUBULAR VACUUM DETECTOR, AMPLIFIER, OSCILLATOR

Price \$6.00 Prepaid

YOUR LAST CHANCE FOR AN AUDIOTRON DOUBLE FILAMENT DETECTOR

Manufacturing reasons make it impossible to continue the present hand-made audiotron. After the present supply is exhausted, new types of audiotron, manufactured entirely by machinery, will be offered for sale.

LEO J. MEYBERG CO. 428 Market St., San Francisco, Calif.

Static Eliminator--Direction Finder-Compass Coil and Indoor Aerial. The "Paradex" Compass Coil

Assists in Tuning Out Undesired Stations. Revives Your Interest in Radio Reception.

As a compass coil and direction finder, the PARADEX will locate the exact direction, within a few degrees, of any received signals. It enables you to locate the direction of amateur and commercial stations and ships at sea. Many other interesting experiments may also be performed.

Where it is impractical to erect masts and aerials, a PARADEX will solve the problem. Locate the coil in the basement, middle flat, attic or roof—it will do the business anywhere.

As a static eliminator it can't be beat. A device of this kind is the only known means of entirely doing away with static. When your friend has to ground his aerial on account of electrical storms, you, with your PARADEX, will still be on the job, copying messages without interference. There is no danger from lightning when using the PARADEX as it requires **NO GROUND CONNECTION**. It will not operate properly with a ground.

1/14 Actual Size. Mahogany Finish. Nicked Brass Fittings. Shipped knocked-down. Requires 10 minutes to assemble. Directions and hook-up furnished.

With one V.T., signals from a station 40 miles distant were readable five feet from the 'phones and with a two-stage amplifier the signals could be heard 80 feet from the 'phones. Good distances can be received with one V.T., but for greater distances a two or three-stage amplifier is recommended **AS AN INTRODUCTORY PRICE FOR A SHORT TIME ONLY THE "PARADEX" WILL BE SHIPPED PREPAID TO ANY PART OF THE UNITED STATES FOR**

\$28.00

Sold on a Money-back guarantee. Dealers: Write for proposition.

PACIFIC RADIO EXCHANGE

431 CALL BLDG.,

SAN FRANCISCO, CAL.

50c

Per Set

Pre-War Issues of
 Pacific Radio News

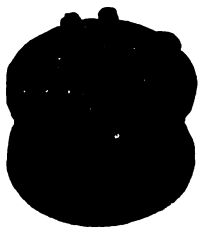
{ FEBRUARY, 1917
 MARCH, 1917
 MAY, 1917

Get your order in the mail early.

Only a few sets on hand

PACIFIC RADIO PUB. CO.

50 Main St., San Francisco, Cal.



Hook'er to Yer Bulb.

The most wonderful Tuner in the world for only \$15. Last month this Tuner beat in a test one of the NAVY STANDARDS at Ketchikan, Alaska.



10 Captains of ocean going ships have had their wireless operators install one of our tuners in the captain's cabin so the exact time by wireless can be had without using either tube, bell, or hand.

"GREAT" says old sea dog. "WHAT IN SAM HILL WILL YOU SMART ALECS GET UP NEXT?" European stations copied in day time and no fancy aerial is needed. A single wire about 40 long by 25 high will do the trick. London amateur W. R. Wade, Clifton, Bristol, promises report for

the magazines to publish showing how the amateurs there read our sigs in England. Junk your funny wound coils and get a regular two pound tuner that you can use during the static season. 20000 meters maximum wave length. Hook up on bottom of tuner.

KNOCKED DOWN AND ASSEMBLED CONDENSERS.

Which kind do you want? Made for panel mounting and are complete with scale pointer and knob. Used all over the world now and still going strong. No C.O.D. orders. Add parcel post. Buy from your dealers and send us

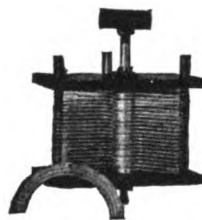
his name if he cannot supply you. Canadian amateurs buy from local dealers or write us for nearest dealer. Formica tops and bases. Movable plates are screwed on and not clamped.

11 plate knocked down	\$1.80
21 plate knocked down	2.25
41 plate knocked down	3.20
11 plate assembled	2.75
21 plate assembled	3.25
41 plate assembled	4.25

Sold by your dealer or

Tri-City Radio Electric Supply Co.

TRESCO—Davenport, Iowa



Pat. App. for

Attention Amateurs!

This is the adapter which tubular bulb owners have been looking for

Price \$1.50

Radisco Agency
We make special instruments
to order



Catalogue sent on receipt of 10c, which may be deducted from first order

Dealers write for propositions.

Amateur Wireless Equipment Co.
1390A Prospect Ave., Bronx, N. Y.

-MARCONI INSTITUTE-

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

335 New Call Bld., San Francisco

When writing to Advertisers please mention this Magazine

THE CONSTRUCTION OF AN IDEAL AMATEUR SHORT-WAVE REGENERATIVE RECEIVER

(Continued From Page 5)

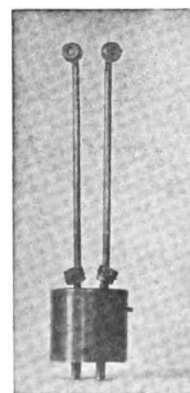
cription, no dead ends whatsoever are allowed in the receiver. Leads from one instrument to another should be as short as possible, but at the same time instruments should not be placed in too close a proximity. The frequency of the current at 200 meters is extremely high, close to 2,000,000 cycles per second and harmonic frequencies are easily induced and interfere with efficient reception. Wires should not be run parallel for any distance in connecting up the set.

The author has experimented for five years on different sets and hookups including many post-war developments, but none was found to equal the one described above.

From New York City amateur stations were easily copied with a single De Forest Audion Bulb, using no amplifier. Some of the longest work done will be found in the following: Dallas, Texas; Kansas City, Kansas; Jefferson City, Mo.; Davenport, Delmar and Monticello, Iowa; St. Paul, Minn.; St. Louis, Mo.; Newport, Ky.; Lake Geneva, Wis.; etc. Most of the amateurs heard in the above cities from New York City were heard not just once but a number of times.

In conclusion it might be suggested that a very efficient 600 meter set could be constructed along the same lines as the one described here for 200 meters. All that is necessary is the use of a larger coupler and larger wire in the variometers is also recommended.

You should be a regular subscriber.



**TUBULAR
BULB
ADAPTER
\$1.50**

**VARIABLE
GRID LEAKS**

A NEW TYPE OF
EXTREMELY EFFICIENT
RECEIVING SET
Write for Literature

Sonoma Radio Laboratories
Box 297, Sonoma, Sonoma Co., Cal.

SPECIAL! For the Summer Only.

AUDIO TRON ADAPTER Our world known famous adapter.



We are offering this adapter for the summer months at the small price of \$1.50. This will enable the Amateur to get one of these adapters for their fall and winter work.

Special

Honey Comb coil adapters which are now in use in this and foreign countries for only \$1.25.

Price \$1.50
Summer Only

We also carry other reliable products such as the
Paragon Rheostats\$1.75
Standard socket 1.00
Paragon short wave receiver.....55.00
Amplifon det. one step.....65.00
W. E. Fones.....12.50
Electron relays 6.00

Let us know your wants and we will quote you prices that will save you money.

TeCo Radio Co.

P. O. Box 3362 BOSTON, MASS.

REMEMBER WE CARRY NOTHING
BUT THE LATEST AND BEST
IN RADIO

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

BACK NUMBERS of "Pacific Radio News" are now available. We have a few copies of the March, 1920, and May, 1920 issues on hand. Ten cents takes a copy of either issue. PACIFIC RADIO PUB. CO., 50 Main St., S. F. Cal.

FOR SALE OR TRADE—Audion Control Panel. Blitzel Receiving Transformer. Western Radio 10,000 Loading Coil. Murdock Phones. Clapp Eastman .0005 Variable. Murdock .001 Variable. Honeycomb coils. Oscillation Transformer. Sell for \$30. Trade for parts two-stage amplifier. L. KING, 659 26th avenue, San Francisco.

ALL AMATEUR APPARATUS bought or made in accordance with the Radio Buyers and Builders Handbook. Invariably resell very profitably. Study my June and July display advertisements. See why and get your copy now. R. CLARK, Barnes Road, Newton, Mass.

REPRESENTATIVES wanted to secure subscriptions to "Pacific Radio News" Write today for attractive proposition. Pacific Radio Pub. Co., 50 Main St., S. F. Cal.

"SHRAMCO"

Specialties are needed for an efficient set

SWITCH POINTS

	Brass	Nickel
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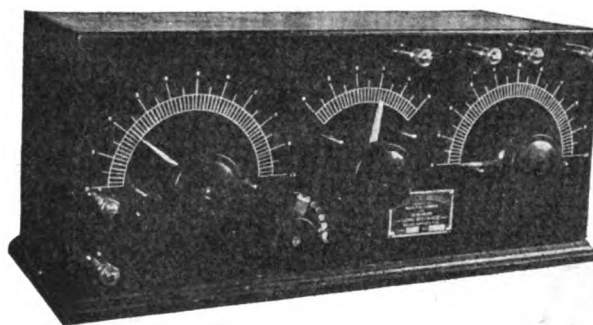
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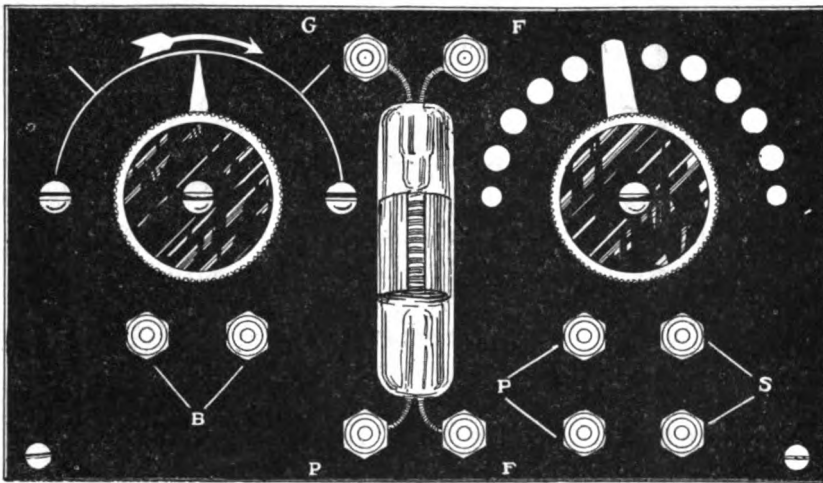
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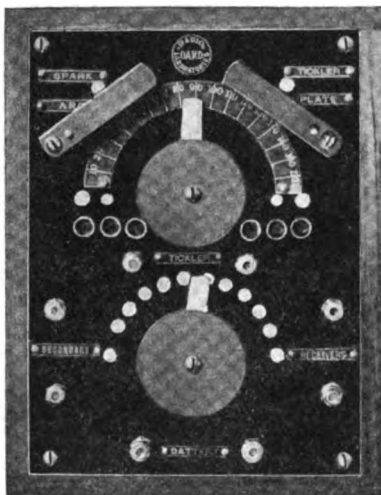
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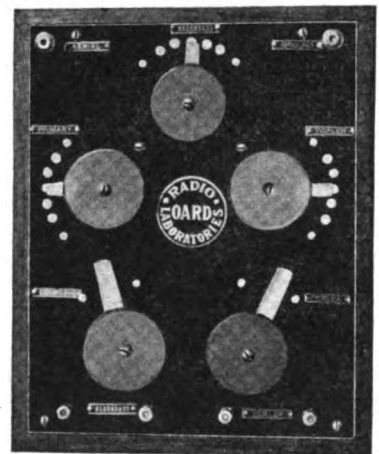
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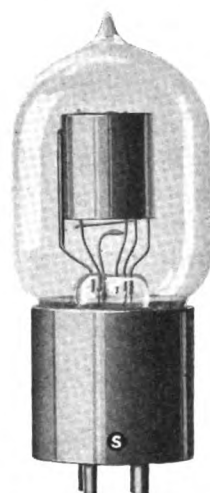
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PACIFIC RADIO NEWS

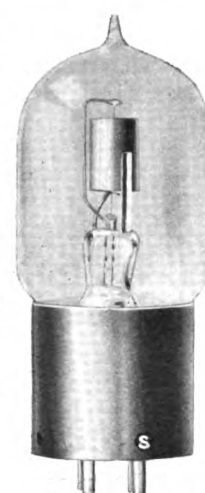
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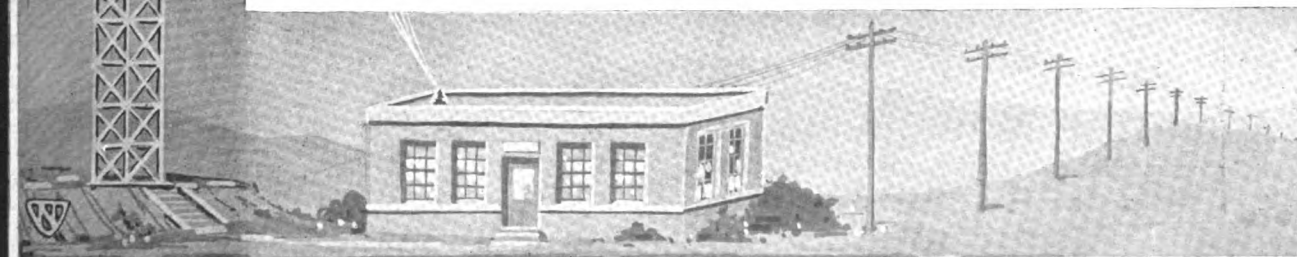
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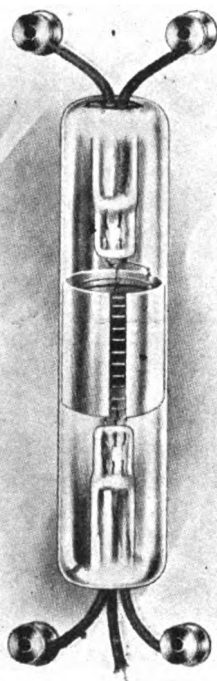
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PACIFIC RADIO NEWS

RADIOTORIAL
BY THE EDITOR

PAUL R. FENNER
Editor
H. W. DICKOW
Advertising Manager
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"AS A MAN THINKETH, SO IS HE"

AND that is a truth that is being proved more and more every day.

There are a certain number of men, radio engineers, radio operators in commercial practice, and amateur operators, who **THINK** that the radio business is no place for them—that there is no money in it; or, in the case of the amateur radio man, that it takes too much of his time. These men knock the radio game hard, but we can forgive them, because they only speak as they **THINK**, and as they think, **SO ARE** they. But it is time for all the knockers to turn over a new leaf. This is the day of reconstruction; the days of destruction have shortly been left behind.

We need reconstruction within ourselves; we need to build our minds anew and fill them with clean, intelligent wisdom, just as we must build our muscles and bodies, physically, by exercise.

First of all—**BE SATISFIED**. If you are a radio engineer for the Blank Corporation at so much per month—**BE SATISFIED**. You may have fifty-seven varieties of things that you can grumble about **IF YOU WANT TO**—but why grumble? **YOU ARE THE MASTER OF YOUR FATE!** If you are in a position where you think you must grumble, **GET OUT!** That's all!! Put yourself where you are satisfied, happy and contented; life's too short to spend one-half of it in knocking, frowning, kicking and grumbling. If you are a radio operator at sea, and you don't like the ship you are on, **GET OFF** when you come ashore and make your report. If you are an amateur operator and your parents say you can't have a radio set any more because your reports are too bad, just sit down and figure out that it is your own fault. Weren't **YOU** the one to neglect your studies? You didn't **HAVE TO** do it.

After you are satisfied that you **ARE** satisfied with radio as a life work, then never be satisfied until you are master of your profession in every detail, for all improvement in life comes from those who are not satisfied with being a poor performer in any work. "Watch your step" and **GROW**.

MEN and BOYS—GET OUT OF THE RUT! THINK RIGHT! Don't blame it on to the other fellow all the time because you are not satisfied. Take stock of yourself and see, first, whether you are not the one to blame for not being satisfied. And if you have done that carefully and realized that you were all right, but that your environment was wrong, why simply **GET OUT** of that environment. Place yourself where you **CAN** be happy.

But many of us are going to have a hard struggle to "police up" our minds. We are going to go to the bottom and pull out all the trash and rubbish, and begin anew.

Here is one of the first things to remember: **ALWAYS LOOK** on the **BEST SIDE** of life; always look on the bright side of the subject. If you are gloating, (for gloating it is), over some despondent problem, or over some disagreeable situation, just say to yourself, "What does it gain myself, or anyone else to worry, despair or grumble about this? I'm going to forget it and think of the pleasantest thing I know of."

And another of the most important things to learn in this life is **CONCENTRATION**. If you have a stack of fifty **MSGS** to get thru. Don't worry about No. 50 while you are sending No. 6, or No. 1. Think of, and do, **ONE THING AT A TIME**.

And a word for the amateur men: **FINISH YOUR SETS**. Don't be com-

pletely changing your apparatus about every month. Sit down and design yourself something that you want,—get to work—and **FINISH YOUR JOB**, and have your set so that any time when you want to send a message you have only to sit down, put on your 'phones, and throw a couple of switches and send. Don't have a bunch of apparatus connected together with seven different kinds of wire, and scattered all over. If you do—you will never be satisfied. Amateurs! Have a complete radio set, and nothing else. You don't have, to have a \$1000.00 set, but you can have a complete one. Improve yourself! If you can't send; practice! Ask some man who knows, whether your sending is all right, and let him tell you why it is not right. Receiving will come to you easy enough. When a man is sending to you, on the air, and has something to say, don't let him send faster than you can receive. It doesn't pay to try to pose as a "speed eater" if you can't hold up your end of the game. You'll be found out sooner or later; besides, the operator sending to you might improve his sending an hundredfold if he did send slower.

But for the man who puts money before anything else; who judges men by the money they have; who accepts positions only because the salary is good, and, worst of all, the man who selects his profession because "there's money in it" we feel extremely sorry, because he gets pretty old before he realizes his mistake in life, **UNLESS** he is saved in time.

There is only one way to success, and that is to enter that vocation or profession where one can give more nearly 100 per cent efficiency, and where one can give the best service. If every one

(Continued on page 30)

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARD

THE following international conventional abbreviation has been published by the Berne International Bureau:

"Q. T. B.—I am not in accord with you in your statement of the number of words. I repeat the first letter of each word and the first figure of each number."

The operator, after sending Q. T. B., proceeds to transmit the first letter of each counted word. Q. T. B., followed by an interrogation point, means "Are you in accord with my check?"

THE British Government has placed a charge of six shillings on bearings received from radio compass stations in British waters.

MR. A. S. McKenzie, who is in charge of the Pacific Radio School in San Francisco, announces that a sending and receiving contest is being held at regular intervals. The contest usually takes place at the end of every month and radio apparatus is awarded as a prize to the winner. Mr. D. B. McGowan, assistant U. S. radio inspector at San Francisco, acts as judge and awards the prize to the best sender, regardless of his speed. A beginner, therefore, has the same chance of winning the prize as the more advanced student.

A contest was held on July 30th and a complete audion control panel with bulb and battery was awarded Mr. W. J. Martin, who has been at the school for only two weeks. The second prize, an Audiotron bulb, was awarded to Mr. C. W. Tinsley, instructor of electricity at the Polytechnic High School.

THE radio inspector at San Francisco states that A. R. Helms, an Oakland amateur radio operator and formerly of the naval radio service, is to be prosecuted for operating an amateur radio station without either operator or station licenses. The maximum penalty for such operation is \$2,500 fine and three years' imprisonment.

WILLIAM Wrigley, Jr., broke the record for wireless telephone conversation on July 16th, according to the San Pedro "Pilot." Wrigley called the Avalon radio station about 2:30 p. m. and was able to converse as rapidly as people in Los Angeles. Over the phone he was given a detailed report of the day's events at Catalina. Mr. Wrigley congratulated the operator on the achievement and added: "Now I suppose you will invent some kind of a wireless wave that will enable me to make week-end trips from Chicago to Catalina."

MR. O. M. Heacock, a jeweler in Enterprise, Ore., has reported hearing the radio telephone at Avalon, Catalina Island, on many occasions. This is indeed remarkable work, considering the fact that Oregon is over 600 miles from Avalon. The receiving equipment used in intercepting the radiophone signals is of the regenerative type. An aerial, 90 feet high and 125 feet long, was used by Mr. Heacock.

THE following extracts are from a letter received from Mr. W. H. Smith, of the Colorado Wireless Association, Denver, Colorado:

"The Avalon radio telephone has been heard in Denver. The voice of the Avalon operator comes in very loud and distinct—almost as loud as an ordinary city telephone system. My receiving instruments comprise a short wave loose coupler, single Audio Tron bulb and a sixty foot T aerial, 130 feet high."

Mr. W. H. Smith's station is located in the Y. M. C. A. building at Denver.

MR. A. E. Bessey (6BR) has just returned from a vacation trip through Southern California. Mr. Bessey had a complete sending and receiving equipment mounted on his automobile with which he was able to communicate with amateur stations along the route at all times. San Francisco amateur stations were heard as far south as San Diego, although the transmitting range was rather limited, owing to the small power available to operate the transmitter.

WITHIN the next few months installation of the combined wireless telephone and telegraph sets will commence in San Francisco, according to Mr. A. A. Isbell, Pacific Coast Manager of the Radio Corporation of America. The new equipments will be installed on vessels leaving this port; it is expected that the Admiral Line will be the first to adopt the new device.

CONSTRUCTION of a large aerial was recently started in San Diego by the Southern Electrical Company for the use of the Boy Scouts' Wireless Plant. Mr. Claude Seaman, manager of the radio department of the Southern Electrical Company, states that an efficient receiving set will be installed in order to enable the Scouts to copy P. O. Z. and other European stations.

STATIC has been eliminated at the Naval Radio Station on Goat Island (Yerba Buena) San Francisco, by the use of an underwater aerial system.

WHEN MELBA sang by wireless telephone to an audience 100 miles away, most folks who read about it were thrilled at the alluring idea.

Why can't all the world listen in, at a future time, when a great diva pours forth her golden notes?

One man, meanwhile, is not waiting for such a development of radio wonders. He is the Rev. Clayton B. Wells, pastor of Fairmont Congregational church, Wichita, Kas. With the co-operation of one of his parishioners, C. A. Stanley, Dr. Wells preaches every Sunday to 1000 wireless operators, amateur and otherwise, who live in a radius of 500 miles from Wichita.

And the wireless "bugs" like it! Stanley cut in one Sunday night to ask how many operators on his wave-length had been to church. There were no ayes, but a babel of noes. A night watchman at a cement plant near Waterloo, Ia., said he had to sleep in the daytime, and thus never got to hear a good sermon.

That started the wireless "services." To the present the operators haven't been told to join in singing "Hymn No. 546," but there are plenty of ethereal Amens when the concluding benediction has been spoken.—"San Diego Sun."

PACIFIC COAST RADIO CONVENTION
PLANS WELL UNDER WAY

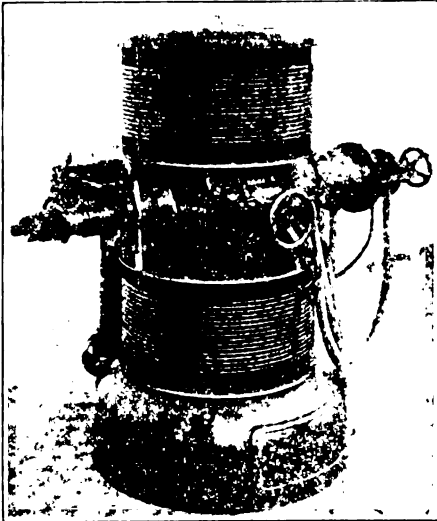
At the last meeting of the San Francisco Radio Club, Inc., it was decided to increase the number of candidates on the Convention Committee to ten instead of five, as was previously proposed. A committee of five leading radio manufacturers will be asked to serve on a special advisory committee in order to co-operate with the club's committee. It is respectfully requested that all radio clubs on the Pacific Coast communicate with the Convention Committee in order to make the coming affair a huge success. It is proposed to have the convention extend over a period of three days. A banquet and Radio Operators' Ball will conclude the affair. Mr. R. M. Klein, manager of the local DeForest office, will install a complete amplifying receiving equipment and loud speaker. Music for the ball will be furnished by radio. Radio clubs on the Pacific Coast, who desire to take an active part in the affair, should communicate with the Convention Committee, San Francisco Radio Club, Inc., 355 Presidio Ave., San Francisco.

If you cannot spare \$2.00 today for a yearly subscription to "Pacific Radio News," send us a dollar bill and we will enter your subscription for six months.

Arc Radio Apparatus

By Jennings B. Dow

Published by Permission of the Secretary of the Navy.



A 20 K. W. Federal Arc.
All parts of the chamber as well as the
Electrodes are water-cooled.

Arc Radio Apparatus, important as it is in the commercial field today, has never come into general use by experimenters. At the present time, it is a most reliable source of sustained oscillations, and, neglecting the recent designs of high-power vacuum tubes and high frequency alternators, it has been practically the only source of undamped oscillating current. At the close of the past year it was estimated that, considering the actual power radiated into space per day for radio purposes, the arc was responsible for twenty times as much as all other systems combined.

The very limited use of this apparatus by experimenters may be accounted for, in a measure at least, by the following facts:

1. Literature on the subject has been very limited because its development has been confined to research by very few engineers, and its commercialization has taken place thru more or less secret channels.

2. The general use of the vacuum tube by experimenters has taken place only within the past few years previous to which time the reception of undamped waves was possible only with such apparatus as choppers and arc heterodynes which, at their best, were very troublesome.

3. Until recently, it was impossible to use the arc successfully with circuits having wave-lengths shorter than 2400 meters.

4. Early designs of arc apparatus were very unsatisfactory in operation, and many pioneers in this field were loath to give them up in preference

to the less troublesome spark apparatus.

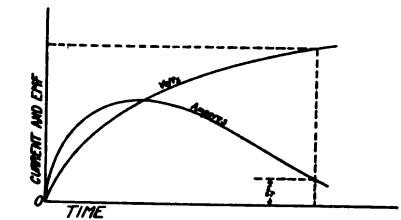
5. The invention of a successful high current microphone, the dream of most early investigators with which to control the arc output for radio telephone purposes, was not forthcoming and many gave up work with this apparatus to search for the more easily controlled generators of high-frequency currents found in the vacuum tube, and, thanks to Mr. E. F. W. Alexander-son, in the more powerful high-frequency alternator.

The Poulsen arc of today is practically as it was some fifteen years ago. It is true that refinements have been added and the sizes have been materially increased, but no great changes in fundamental principle have been made. Considerable effort has been put forth lately towards the development of the smaller sizes (under 5 K. W.), which have always been a source of much trouble, and toward the development of the arc for use with circuits having short periods of oscillation, that is, frequencies over 200,000 which correspond to wavelengths below 1500 meters. This effort has been awarded with some measure of success.

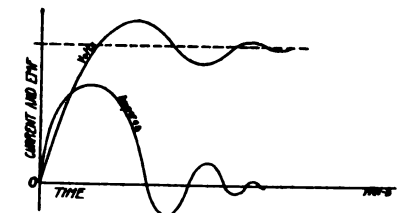
The phenomena taking place between the electrodes of the arc are not well understood; the exact theory of the magnetic field and the gas which is administered into the chamber are still puzzles; and the theories advanced on these are awaiting proof. With regard to the oscillating circuit, potentials of hundreds of thousands of volts are commonly found in certain parts of this circuit, even though but a few millihenries of inductance and a small capacity are used. Mathematics accounts for only a small portion of this potential.

The author has found recently that the constants of the supply circuit seriously affect the operation of the arc at the higher frequencies, and has also found that by applying certain laws founded upon an investigation of this characteristic, that pure undamped waves, rivaling those produced by the vacuum tube, could be obtained up to frequencies as high as 300,000, corresponding to a wavelength of 1000 meters.

In the development of the arc to its present status, great credit is due the engineers of the Federal Telegraph Company whose work resulted in the development of the high power arc apparatus with which it was possible to transmit



$e = \text{residual current due to } e = L \frac{di}{dt}$
CONDENSER CHARGING THRU INDUCTANCE AND A RESISTANCE
OF SEVERAL OHMS



CONDENSER CHARGING THRU INDUCTANCE AND A
VERY LOW RESISTANCE

Figure 1

an almost uninterrupted flow of dispatches during the war from our shores to our forces at sea and abroad.

Theory of the Arc

The singing arc, the discovery of which is due to Duddell's work in 1900, was the forerunner of our present arc radio transmitter. If an ordinary electric arc between two had uncured carbons be shunted with a circuit consisting of an inductance of a fraction of a milli-henry in series with a capacity of a few microfarads (ordinary paper telephone condensers if the arc voltage is not greatly in excess of 110 volts), it will be found that under certain conditions of adjustment, the arc will emit a highly musical note which may be varied by changing the magnitude of either inductance or capacity. An inductance of a henry or more should be placed in each leg of the supply circuit. The phenomena briefly is this: owing to the potential difference across the arc, a current begins to flow into the condenser circuit; this current, however, is virtually robbed from the arc because the time constant of the inductance in the supply circuit is such that a sufficient momentary current is not available to supply both arc and condenser circuit, and the current consumed by the arc falls off. Owing to this falling characteristic of the arc, the potential across the electrodes rises as the current falls off and more current flows into the shunt circuit further charging the condenser. The current rises very rapidly at first (see curve in Fig. 1)

(Continued on page 24.)

ARCO RADIO APPARATUS

(Continued from page 23.)

owing to the low resistance and small value of inductance in the shunt circuit.

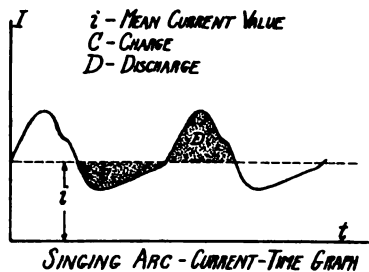


Figure 2

As the charging of the condenser continues the current reaches a maximum

and then begins to decay because the impressed electro-motive-force and the condenser electro-motive-force resulting from the charge approach the same value. When the condenser is fully charged, a current still continues to flow owing to the self-inductance of the circuit. This additional current tends to over-charge the condenser, the potential across it becomes greater than the impressed electro-motive force, and a current flows back into the arc discharging this stored electrical energy.

It will be observed by referring to Fig. 2, that the effect of the condenser circuit is to make the current in the arc pulsating and that the current never reaches zero in value, in other words, the

arc is never extinguished and this is the case usually found in singing arcs.

The ordinary singing arc has little place in the radio field as its efficiency is a matter of only a few percent, and the frequency of oscillation is entirely too low. It may be so modified, however, that its efficiency may be materially increased and the frequency of oscillation brought well within the range of radio frequencies. These modifications consist chiefly in changing the material of the positive electrode to copper, in enclosing the arc within an air-tight chamber into which a hydrocarbon gas may be administered, and in placing the arc within a powerful magnetic field.

(To Be Continued)

Commercial Operators Ask Pay Increase

THE United Radio Telegraphers' Association, a nation-wide organization of marine radio operators, recently conferred with Admiral Benson, chairman of the Shipping Board, in order to present their demands for an increase in wages for radio men employed aboard ship. The demands included an eight hour day, with provisions for overtime pay, increases of pay amounting to \$75.00 monthly for senior radio operator and \$50.00 monthly for junior operator, assurance that operators would not be required to perform additional services on board ships and that they would be permitted to leave the vessels when they were in port. The chairman of the Shipping Board and various shipowners refused to grant the demands. By figuring the overtime clause on a rather liberal scale, the shipowners declared that a chief operator might draw as much sal-

ary as a first mate on a large freighter. The main purpose of presenting the aforesaid demands was to put the marine radio operator on the same basis of pay as the third mate on the average vessel.

Admiral Benson proposed a plan whereby the salaries of the operators will be increased with the performance of certain years of service. For instance, it is believed that the Commissioner of Navigation will recommend a certain percentage of increase every few years. It is suggested that a 10 per cent increase be put into force for the chief operator every three or five years. It is said that the governmental board feels that the radio service should be encouraged and that there ought to be some stimulus for an operator to remain in the service after he obtains a position as senior operator. At the present time he cannot make more than \$125.00 per

month if he confines himself to radio work.

The United Radio Telegraphers' Association is working out a plan whereby four distinct grades of licenses may be issued to commercial radio operators. This plan will be submitted to the Commissioner of Navigation. Applicants who successfully pass the examination for a commercial license, but who have had no experience aboard ship, will receive a fourth grade license, according to the provided plan. A first grade license will be issued only to commercial operators who have served as senior radio operator aboard ocean-going vessels for a number of years. In this manner an operator with years of experience will be rewarded with better pay. The leaders of the association have accepted a proposal made by Admiral Benson for the extension of the life of the present agreement for ninety days.

Standardization Department

We beg to offer to the science of radio communication and allied branches of the radio industry a new department as a clearing house for ideas on standardization, and as a means for establishing for radio engineers, designers, experimenters and other interested parties certain accepted standards in this field.

It is the intention of this department to be the mouthpiece for authorities on the subject of radio, and, in fact for all those who can submit intelligent ideas towards the standardization of radio terms.

Radio is a young branch of science and, although it has seen many years of commercial practice, it is in bad need of standardization. The advance of the science has been so extremely rapid that it has heretofore been practically impossible to determine on any common

and accepted basis, terms, methods, designs, dimensions, systems and so forth. It is felt that a department of this type in this publication will bring about a means of working up to a point of complete standardization of the elements of the radio industry. Radio engineers, radio experimenters in colleges, universities or private laboratories, physicists, and, in fact, all men interested in the commercial and practical phase of the radio science are invited to contribute their ideas towards the building up of terms, symbols, methods, dimensions, designs, systems, etc., and standardizing them throughout the United States.

Material for this department must be written on paper 8x11 inches (letter size) preferably typewritten double space, with writing on one side of the paper only. If original manuscript is desired to be returned, stamps must be enclosed.

AMATEUR WIRELESS MEN INTERRUPTING PLANE FIRE PATROL

Please get off the air wave.

This is the plea of Captain Walsh, in charge of the wireless at Mather Field, to two amateur wireless operators, believed to be operating in this city. They sign themselves "6 G R" and "6 G F."

Through the interposition of these two operators Mather Field is finding it very difficult to keep in touch with the planes in air patrol work.

"We can't get our messages through because of the air rumpus caused by these two mystery operators," Walsh declared yesterday.

Walsh doesn't care how much the amateurs cut up at night, but his plea to them is to keep out of the air between the hours of 8 a. m. and 5 p. m. —Sacramento Union.

An Efficient Radio Telephone

By Edwin S. Watkins

A simple, yet efficient, continuous wave transmitter for either telephone or telegraph signals is within the means of every radio amateur possessing a few vacuum tubes, some batteries and the usual line of miscellaneous material found around the experimenter's laboratory.

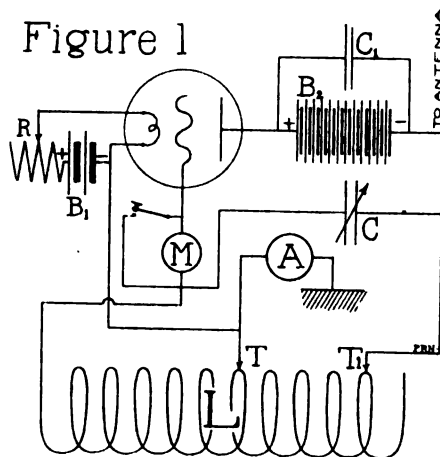
The main difficulty with most short wave bulb sets is their instability of oscillation. The importance of such a condition may be readily realized if one calls to mind that the difference in frequency between waves of 199 and 200 meters is over 7500 cycles and that if the difference in timing between the receiving and transmitting sets be more than 2 meters the resultant "beat" will run into inaudibility.

The set described below was, during actual daylight tests in the summer, between Souge and Coetquidan, France, a distance of about 90 miles, found to render quite efficient results on both continuous waves and telephone, using three French "Fotos" amplifier tubes whose constants were somewhat similar to the new Moorhead tube. The wavelength used was 192 meters and the plate voltage during most of the tests was 220 volts, altho it was found that readable telegraph signals could be obtained with as little as 90 volts on the plate.

Referring to the diagram; (Fig. 1) the inductance, L is made up of 60 turns of numbers 18, D. C. C. wire, so wound on a $2\frac{1}{2}$ inch tube, that it may be tapped into with leads T and T1, on any turn between the 20th and the last. This is best accomplished by baring and twisting about $\frac{1}{2}$ inch of wire at each turn, being careful not to short-circuit the turns. Feed-back and change of wave is secured by the above taps and condenser C, of .001 mfd. capacity. C, is a .5 mfd. fixed condenser shunted around the high voltage battery, thus reducing the high frequency resistance due to the battery. It should be insulated to withstand twice the voltage of the battery B2 on account of high frequency surges which are liable to puncture it. When using 220 volts on the plate, a standard .5 mfd., 550 volt telephone condenser functioned quite satisfactorily.

The microphone, M, operates best when in series with the grid, as shown. In our tests we had access only to high resistance types; consequently to obtain good results, had to utilize at least three in parallel.

Connecting the microphones across several turns of the inductance, L and putting it in the ground lead were both



tried, but in the former the audibility dropped fully fifty percent and in the latter a continuous buzz, due probably to arcing between the carbon granules, accompanied the signals. The only advantage gained by shunting the microphone across several turns of the inductance is that the potential drop across the former is comparatively low and if the speaker happens to accidentally touch it he will not receive the jolt he would get were it in the grid circuit.

An ordinary six volt accumulator, B1, lights the filaments of as many bulbs in parallel as you wish to operate. If more than three bulbs are used the wire on inductance L should be increased in size proportionally.

A radio frequency ammeter, A, in the ground circuit is necessary in tuning the set. Its size will depend on the number of tubes used.

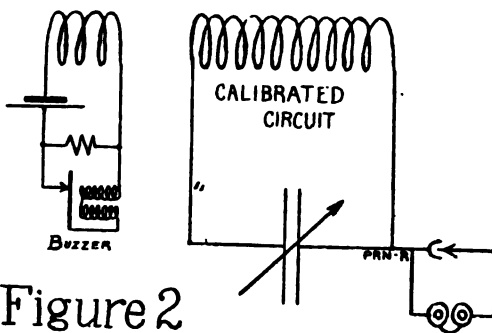


Figure 2

Connect the apparatus as indicated, using flexible leads with connecting clip terminals for T and T1. The tubes are then lighted to slightly above normal brilliancy and the telegraph key, K, around the microphone, closed. A buzzer jigger wave meter, (Fig. 2), is placed in inductive relation to L. Terminal T1 is connected to the end of inductance L, and T is connected approximately in the

center. The condenser is regulated to about one-half its capacity. A reading on the ammeter indicates when the set is in oscillation. The wave meter frequency is then varied until maximum response is received in the head phones. If the signals are very loud, remove the wavemeter until they are just audible. A wave length reading should be noted. Another reading is then taken with T1, at the fourth turn and T at the twentieth turn. From these two readings you can estimate approximately how many turns to use for the desired wavelength. When the latter condition is obtained, the ratio of turns on either side of T is varied in conjunction with condenser C until maximum radiation is indicated.

If the constructor of this set possesses a sensitive hot wire meter, (a milli-ammeter reading 0 to 150 or 300 ma.), the wave meter circuit shown in Fig. 3 will be very precise in its working. It must, of course be ascertained whether the wave length radiated by the oscillator is long enough to affect the wave meter. This can only be found by computation or by experiment. With the circuit shown in Figure 3 and the oscillator in operation, the wave meter milli-ammeter will indicate current very quickly when the condenser C is on the correct wave. Sometimes, however, moving the condenser a sixteenth of an inch will throw it out of resonance.

It will be found that a very fine compensating adjustment for the changing of wave length for the different positions of T and T1 can be made with condenser C, thus keeping the radiation at a maximum thruout the wavelength range.



Figure 3

Using the three above mentioned "Fotos" bulbs it was possible to put out as much as one ampere, on 300 volts, in the plate circuit. At 220 volts the radiation was slightly less. The output dropped to .6 of an ampere when the microphone was in circuit.

Telephonic communication between airplanes and from airplane to ground

(Continued on page 38.)

RADIO station 7YS holds the distinction of being one of the most efficient stations in the state of Washington. The station is owned and operated by Rev. Sebastian Ruth, of St. Martin's College, Lacey, Washington. Amateurs in California report good signals from 7YS. The best distance covered is Phoenix, Ariz. Rev. Ruth has often heard 6GQ, 6CC, 6BQ, 6BR, 6AT, 6CO, 6CS, 6FE, 6OH and others. A total number of 216 relay messages have been handled by 7YS since January 1, 1920. Weather reports are broadcasted every evening at nine o'clock on 375 meters.

The receiving equipment consists of a short and long wave regenerative receiver, equipped with honey-comb coils. A Murdock one kilowatt transformer is used for transmitting as well as a special type rotary gap, oil immersed condenser

7 Y S
The well known
amateur radio
station of
Rev. S. Ruth,
St. Martins College
Lacey,
Washington



and a large oscillation transformer. The aerial is of the "T" type, 100 feet high and 300 feet long. Stranded phosphor bronze wire is used throughout.

For long wave reception a single wire aerial, one-half mile long, is used. The radiation of the transmitter is six amperes on 375 meters.

How to Get a Patent

By T. A. CUTTING

ANY person who has invented something useful and new may apply for a United States patent. It is not necessary to pay an attorney a large fee to make out the papers; any inventor is privileged to prosecute his own case. This is not a difficult matter if one knows how to go about it.

The total cost of a patent, if an inventor makes his own drawings, writes his specifications and the description of his device, is thirty-five dollars. It is payable to the patent office in two installments, fifteen dollars upon submitting the application and twenty dollars when the final papers are made out.

If a person hits upon something new in his radio experiments, the cost of a decision upon its patentability is merely the cost of the application—fifteen dollars. If there is any uncertainty concerning the commercial value of an invention, it is a good plan to draw up the papers and sketches in the manner that will be explained and mail them, either flat or in a substantial mailing roll, to the Commissioner of Patents, Washington, D. C. Even the initial fifteen dollars may be omitted. The informal application will then be placed on file in the government office, and the idea is safe.

Now ask others about your idea; try to sell the prospective patent, or get someone interested in its promotion. As soon as you are convinced of its commercial possibilities, send the fee and continue the prosecution of the case.

All this must be done within one year, however, or the application will lapse.

There are five necessary requirements in applying for a patent:

1. A petition
2. An oath, requiring a notary's signature.
3. A carefully executed drawing of the device.
4. A specification describing the invention.
5. An initial government fee of \$15.

The United States Patent Office, Washington, D. C. will furnish a free booklet upon request, entitled "Rules of Practice in the U. S. Patent Office", which contains the proper forms for the petition and oath. These forms must be copied and filled in, and the oath sworn to before a notary.

The drawing must be made on bristol board, ten by fifteen inches in size. There must be an inch margin left all around, and inside the margin at the top, a space of one and a quarter inches must be left for the printer's title. The drawing must be done in India ink with draughtsman's instruments, and the parts of the device neatly numbered.

The specification must begin in the formal manner indicated in the specimen patent, printed in the "Rules of Practice." It must then tell to what the patent relates, enumerate the objects of the device, and describe in detail the manner of its construction and operation, detailed reference being made to the drawings.

The claim concludes the specification. This is the most important part of the patent, and must be carefully written so as to fully protect the invention. Claim everything about your device that you believe to be new. If you claim something that has been invented before, the examiners will reject the claim and refer you to previous patents showing the same device. But rejected claims are no need for discouragement. Send for copies of the patents cited, study them carefully, see if the idea is really the same as yours; if not, revise your claims, wording them more clearly or specifically, and point out to the examiner wherein your device essentially differs from that which he has cited.

The correct form for amending specifications or claims will be found in the aforementioned "Rules". Many times a slight change in the wording of claims will result in their final acceptance. A carbon copy of the entire specification should be kept so that the examiner's references to page and line may be traced.

The examiner will give notification as soon as the case has been allowed, and when the final fee of twenty dollars is to be paid. It takes three or four months, as a rule, to get the examiner's preliminary report. Every application must await its turn, as the amount of accumulated business is extensive. The whole process of getting a patent will often take more than a year, but development may safely begin as soon as the patent has been applied for.

MANUEL Spagnuolo of 721 Kirkham street, Oakland, Cal., (6LL) has been penalized by the local radio inspector for causing willful interference with

other amateur stations. His license has been suspended for a period of thirty days.

You pay \$2.40 a year for "Pacific Radio News" if you buy it from your news dealer every month. You save 40 cents by subscribing. Why not do it?

Radio Club News

NEW RADIO CLUB IN MILWAUKEE

The Wisconsin Radio League, 373 Broadway, Milwaukee, Wisconsin, was recently organized to further the interests of radio communication. Mr. R. F. Laidlow is president of the club, Mr. Merwin Grogan is vice-president and Mr. Erving Strassman is secretary.

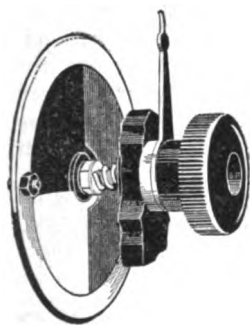
AUDION RAFFLE AT RADIO CLUB

On August 17th, the San Francisco Radio Club, Inc., will hold an audion raffle for the purpose of raising sufficient funds to complete the installation of the club's radio equipment. Audion apparatus of every description will be raffled and refreshments will be served. Several prominent speakers will address the audience. The initiation fee has been reduced to one dollar, extending over a period of thirty days. All prospective applicants should communicate with the secretary at once in order to receive the benefit of the low initiation fee.

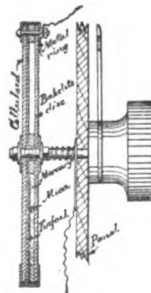
A NEW VARIABLE CONDENSER OF RADICAL DESIGN

Mr. John Parkin, Manager of the Parkin Mfg. Company, has applied for a patent on a variable condenser of unique construction and low minimum capacity. The condenser is constructed of three discs; one of fibre, one of mica and one of celluloid, the mica disc being in the center. Between the celluloid and mica disc is placed a semi-circular plate of tinfoil which forms one of the plates of the condenser. The fibre disc is separated by a distance of about 1/16 inch from the mica disc at the periphery by an insulating washer and at the center by a metal washer which serves to make contact with a quantity of mercury, with which the lower half of the space is filled. The accompanying views show the constructional details of the new condenser.

From the working sketch it will be noted that the discs are held together by a metal ring at the periphery and contact is thereby made with the foil plate. The ring is clamped securely in place under a pressure of five tons, making the escape of the mercury an impossibility. Connection for one side of the circuit is made by soldering a lug to the shaft, and from the other side, by a flexible wire attached to the ring provided for this purpose. This contact can also be made by a strip



of brass, mounted on the back of the panel and bearing against the ring. From the above it will be seen that the tinfoil constitutes one side of the condenser and the mercury constitutes the other. The mercury, by its own weight, is caused to remain in the lower half of the chamber at all times while the tinfoil plate will rotate with the condenser. Therefore, by rotating the tinfoil plate it is easily seen that the capacity of the condenser may be varied. The unit is only three inches in diameter and has a capacity of .001 mf. The full capacity is obtained when the tinfoil plate fully covers the layer of mercury. The



high capacity obtained in such a small space is due to the separation between the mercury and foil by means of the thin ruby-mica insulating disc. A lower minimum capacity that is possible to obtain with an air condensed is claimed by the manufacturer. A transparent celluloid cover allows the operation of the condenser to be visible at all times and facilitates the original setting in a zero position.

We need more amateur station photos and descriptions for publication in "Pacific Radio News." Every amateur who sends us a photo of his apparatus will receive the copper half-tone free of charge. Get busy!

We pay one cent per word for accepted "How-to-make-it" material. Get you pen and ink on the job.

Radio Club Directory

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., 355 Presidio Ave., San Francisco, Calif. Meetings every Tuesday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary, 355 Presidio Avenue.

The Bay Counties Radio Club. Meetings held every Friday evening at 354 Perry St., Oakland. Special Notice: Meetings suspended for summer months. Next meeting to be held on August 27th. Monthly dues 50c. Age limit 16 years. Visitors welcome. Address communications to the secretary, 354 Perry street, Oakland. —adv.

SIXTH DISTRICT AMATEUR STATIONS—Continued.

6WW	N. Lewis, Jr.	2666 Orchard st.	Oakland, Cal.
6WX	W. Korf	816 N. Main st.	Napa, Cal.
6WY	E. Kensky	689 62nd st.	Oakland, Cal.
6WZ	Al Munzig	1017 Tribune st.	Redlands, Cal.
6AAB	F. Thompson	348 W. Milford st.	Los Angeles, Cal.
6AAC	E. Hockenbeamer	721 Arlington ave.	Berkeley, Cal.
6AAD	H. J. Balden		Fillmore, Cal.
6AAE	L. T. Hall	691 Post st.	San Francisco, Cal.
6AAF	L. B. Hinckley		Fillmore, Cal.
6AAG	C. A. Coffman	R. F. D. Box 140	Anaheim, Cal.
6AAH	C. Baldwin & M. Gardner	R. No. 6 N Center	Phoenix, Arizona.
6AAI	H. Ambler	1070 10th st.	San Diego, Cal.
6AAJ	N. C. DeWolfe	1540 Palou ave.	San Mateo, Cal.
6AAK	A. B. Lopez	206 Ellsworth	Santa Barbara, Cal.
6AAL	H. Fleur	720 Santa Barbara st.	San Francisco, Cal.
6AAM	C. H. Wiles	R. F. D. No. 1, Box 57A	Stockton, Cal.
6AAN	Jack Dent	3rd and Elm st.	San Diego, Cal.
6AAO	R. S. Hewitt	3039 Royal st.	Los Angeles, Cal.
6AAP	C. E. Peterson	529 Santa Inez Drive	San Mateo, Cal.
6AAQ	C. Bane	262 Castro st.	San Francisco, Cal.
6AAR	C. Zeigler	6355 Dana st.	Oakland, Cal.
6AAS	F. F. Moffett	843 Lake st.	Reno, Nevada.
6AAT	I. H. Brush	545 B st.	Santa Rosa, Cal.
6AAU	J. Byrne	28 Union st.	Santa Cruz, Cal.
6AAV	V. Elliott	840 Magnolia st.	Pasadena, Cal.
6AAW	A. Woolf	1904 Shattuck ave.	Berkeley, Cal.
6AAX	K. Burzell	2705 Mobile ave.	Sawtelle, Cal.
6AAY	P. H. Gilbert		Big Creek, Cal.
6AAZ	E. A. Banks	1648 Neal st.	San Diego, Cal.
6ABA	P. F. Johnson	2940 Maiden Lane	Altadena, Cal.
6ABB	Edw. Prosek	1085 Church st.	San Francisco, Cal.
6ABC	A. K. Aster	910 Chestnut st.	Alameda, Cal.
6ABD	R. C. Thom	2625 53d st.	Los Angeles, Cal.
6ABE	W. R. Dodson	924 A ave.	National City, Cal.
6ABF	C. S. Smith	3512 Park Blvd.	Oakland, Cal.

Whistling Posts and Wireless Wizards

By M. Preston

OLD J. P. Warford, an ex-railroad operator of the old school, looked up suddenly from his cramped little desk to behold his small son standing outside with his nose flattened against the window pane, looking at him with an automobile salesman's expression on his face.

"Humph," said the old man, "must be Saturday again."

Mr. Warford drew a leather purse from his pocket and extracted a small coin which he laid on the railing that shut off his small desk space from the public. He jerked his thumb towards the coin and turned to his cluttered desk.

Jimmy entered the office gingerly and snapped up the coin with his usual alacrity, but instead of hastily retreating, as was his regular custom, he lingered at the railing, standing uneasily first upon one foot and then upon the other, gazing at the maps and ads upon the dingy walls as if he had never seen them before.

"Well," said Mr. Warford, looking up again, "didn't you get it?"

"Yes, but—"

"'Yes but', nothing, your Dads busy go on outside now and blow your money."

"But Pop, listen—"

"Get out," roared the old man, "I've got work to do. I'll talk to you tonight when I come home."

Jimmy vacated the office with reluctance.

A few moments later Mr. Warford became aware of a peculiar scraping sound beneath his feet. Occasionally there was a thump and a grunt and then more scraping. Old J. P. was very busy that morning. As a rule he was a tolerant father but today his already frayed nerves wouldn't stand for Jimmy fidgeting around the office. He took a paper weight from the desk and hammered lustily upon the office floor.

"For the love of Milke cut it out down there," he bellowed. "Keep out from underneath there, you'll ruin your clothes."

"I want this pipe and wire," came Jimmy's muffled voice through the floor.

This was too much for J. P. He would have to see what that young hyena wanted. He went outside and stood by the little square door that served as the entrance to the dark interior under the office.

"Come on out of there," he said sternly.

A grimy face and a pair of dusty shoulders protruded through the door.

"Pop, can't I please have this old wire and water pipe that's under here?"

"What in the devil do you want with that junk?"

"I want to put up a wireless station."

"Wireless station? Then you don't need any wire. What you need is a face wash and a hair cut. Come out of there."

Jimmy came out and dusted off his clothes and did some thinking. It was quite evident that he had an irate parent to deal with and therefore the situation should be handled with care.

"Pop, no foolin'. I want to put up a wireless station. Lots of the boys have them and they can hear messages from all over. I know how to put it up if you will let me, and you can listen on it too."

This last remark was one of strategy. It hit the bullseye. Mr. Warford had been a telegraph operator for the major part of his life and "once a telegraph operator always one," in heart at least. Many times here of late he had felt lonesome for the click of the sounder. He felt that something had gone out of his life that belonged there. The thought that he might sit in his own home and listen to "traffic" going through was a pleasant one.

"But, Jimmie," he answered, "wireless is a new thing. It's a complicated and expensive pastime for grown-ups just now. I'm sure I don't understand it and I'm darned sure you don't. It would take a lot of money and I haven't any to throw away on something that probably wouldn't work. Wait until you get a little older and go to school and learn something about electricity before you try to put up a station. Anyway I don't own that stuff underneath the office. It belongs to the man that owns the building. I'm just renting this office. Go on down town and take in a movie and forget it."

"It don't take much money, either, just for a receiving station," said Jimmy. All you need is a coherer, telephone receiver and a tuning coil. I can make the tuning coil and if I could have this pipe for a pole and the wire for an aerial I could put the whole thing up for just a couple of dollars."

If Jimmy had talked about the theory of a vacuum tube, his Dad wouldn't have known any more about it.

"I'll take your word for it, Jimmy, but forget about it for today and I'll talk it over with you tonight after supper."

With that Mr. Warford went back to the office, lit a fresh cigar and said to his partner across the room. "This wireless is getting to be quite a thing. I'm putting one up out at my place. Don't know how it will pan out, of course,

I'm just experimenting with it. I ought to be able to get messages and press for a hundred miles around."

"Is that so?" answered Frank. "Don't know anything about it, myself, but I should judge it would be very interesting as well as expensive, from what I've heard."

"Oh no, not expensive," said Mr. Warford. "Just a few dollars outlay for a receiving station. Why, all you need is a coherer and a -er-r-r tuning coil, I believe it's called, and a telephone receiver. Of course you have to have an aerial."

In the meantime Jimmy had gone around to see a certain Mr. Osgood who owned the real estate office occupied by his Dad. Mr. Osgood said that the old wire and water pipe beneath the office were no good to him and that Jimmy could have them. Jimmy requested and received a note to this effect addressed to his father.

Jimmy was more pleased with the note than he would have been with a check for a million dollars. He rushed breathlessly into his father's office with it and waited for the verdict.

"You're one of these quick and silent workers, eh?" said the old man. "How in thunder do you figure you will get it up to the house?"

"Drag it up."

"Drag it? Good Lord, that's about a mile and a half. You must think you are a truck horse."

"Well then, if you want to know, Bud is going to help me drag it up as far as the switch where the street car stops and most of the passengers get off. Then we are going to wait for Mr. Riley's car. He is that fat, grey-haired conductor. He said he would let me hitch it behind the car if I didn't tell anybody about it."

"Alright, if you can work it that way, go ahead. But don't try to put the pole up until I get home and help you. It's liable to fall on you."

"Can I have a couple of dollars to buy that stuff so we can have her working tonight?"

Old J. P. with many inward misgivings, but still hopeful, gave his son a five dollar bill. The bill and boy both vanished.

That day was, perhaps, the busiest of Jimmy's young life. Like all boys, what he wanted, he wanted bad, and didn't want to wait a minute for it. He hopped on a street car and went down town to a wireless shop and purchased a coherer, watchcase seventy-five ohm receiver, some cotton covered wire and a short length of 'phone cord. Then he

With the - - - Manufacturers

NEW RADIO COMPANY IN SEATTLE

The Northwest Radio Service Company, of Seattle, Washington, has been organized with headquarters at 609 Fourth Avenue, where a retail supply store will be conducted. The company has secured the Washington and Oregon agency for the Radisco apparatus as well as the Amrad product and others. A deForest radio telephone has been installed at the store for broadcasting music and speech daily. The Northwest Radio Service Company has the exclusive deForest agency for the city of Seattle. Commercial and amateur radio apparatus is carried in stock.

Static's enemy is here. "NOSTAT" has been placed on the market by Mr. Arthur Lynch, of Brooklyn, N. Y. The new device enables the operator to tune out static with perfect ease; it discriminates between the tones of the incoming signals as produced in the telephone receiver, just as the radio set discriminates between the electrical wavelengths. The "NOSTAT" pamphlet, that has just been issued, is a valuable bit of information that should not be overlooked by any radio man.

The American Radio and Research Corporation has distributed a complete trade catalog to the many radio dealers in this country. The catalog comprises five bulletins that deal with Quenched Gaps, Spark Coils, Oscillation Transformers, Transmitting Keys, Resistances, Wavemeters, Detectors and Lightning Switches. The catalog is of a very artistic design.

Mr. H. Berringer, who is in charge of the radio department of the California Electric Supply Company, has duplicated the transformer and rotary gap that he is using at his amateur station (6BJ) and has placed it on the radio market.

The Klaus Radio Company of Eureka, Illinois, is establishing agencies in various parts of the country to distribute a new line of apparatus. Besides manufacturing its own apparatus, the company distributes Grebe, DeForest, Murdock and other prominent makes of radio equipment.

Mr. C. A. Peregrine has succeeded Mr. G. G. Greene as instructor in charge of the Marconi Institute in San Francisco. One of the new one-half kilowatt Radio Corporation lamp transmitters will shortly be installed at the school.

ONE of the most distinct features of the Avalon radio telephone installation is the bell ringing arrangement. Confusion of messages from promiscuous wireless phones is eliminated and it is unaffected by messages from stations using the same wavelength. It will cut out all impulses except those on the Catalina service.

CORPORAL C. Morrison, formerly a signal corps radio operator on the U. S. A. T. "Sherman," is serving a four-year term in the local military prison. Morrison was found guilty of embezzling four hundred dollars of government funds collected on the vessel for radio tolls.

ANNOUNCEMENT

Mr. T. Lambert's article, "A Short Wave Regenerative Receiver," will appear in our next issue.

You should use the Classified Advertising section of "Pacific Radio News" if you desire to dispose of your apparatus. The rate is only three cents per word.

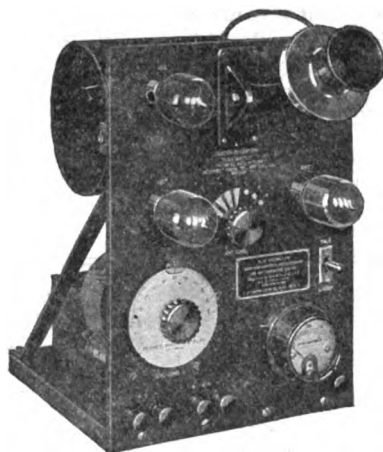
ANY AMATEUR CAN DO IT

Write to the Pacific Radio Publishing Company today and we will tell you how you can make many spare dollars by securing subscriptions to "Pacific Radio News."



Announcing The DeForest Portable Buzzer "Radiophone"★

TYPE OT-5



DeForest Portable "Radiophone"
Transmitter
Buzzer Type OT-5

THE LATEST development of the famous De Forest Oscillation Transmitter (Wireless Telephone). For Automobiles, Motor and Sail Boats, Camps, Surveying and Exploring Parties, Forest Patrol, Farms, and all isolated places, this new "Radiophone" set offers sure, quick, practical word-of-mouth communication. Operates on two 6-volt storage batteries; no "B" battery or other outside source of high potential is required. Can be easily transported; entire Transmitter, including batteries, weighs less than 60 pounds. Range on ordinary Amateur aerial, is 5 to 10 miles, and can be materially exceeded under proper conditions. Operates with any suitable type of Receiver and Audion Detector; with or without an Audion Amplifier, depending on the range to be covered and loudness of reception desired.

Price

Without Storage Batteries
Including Vacuum Tubes
F. O. B.—New York

\$135.00

Investigate this new DeForest production now. Order at once to insure early delivery, either through your regular dealer or direct from us.

DeForest Radio Telephone and Telegraph Co.

Inventors and Manufacturers of High Grade Radio Apparatus
1425 SEDGWICK AVENUE NEW YORK CITY, N. Y.

Lee DeForest, Inc.

451 Third Street, San Francisco

Western Distributors

★"Radiophone." Name copyrighted



WHISTLING POSTS AND WIRELESS WIZARDS

(Continued from page 28.)

talked a garage man out of a half-dozen cast-off dry cells.

He hurried home again and set about the construction of his tuning coil. An old rolling pin was pressed into service. Its handles were sawed off and the wire wound around the roller. A heavy piece of wire with a bit of sheet brass wrapped around it served as a slider. He mounted this astonishing outlay of apparatus on an old table close to his upstairs bed room window and then, with the aid of Bud and Mr. Riley's street car, the pole and coils of old lighting wire were brought to the house.

The heavy insulated wire that was to be used for his aerial gave him lots of trouble. It stood to reason, he thought, that no wireless message could penetrate the insulation, so therefore it must be burned, pounded, or scraped off. When this tedious task was completed he enlisted the services of several of his friends and the pole and aerial were hoisted into position, every bit of thirty feet above the ground. By supper time he had his station in commission, and the United Wireless station at the University, ten miles away, was coming in loud enough to read quite plainly.

When old J. P. came up the walk that evening he looked with distinct disfavor on Jimmy's bent mast and scraggly aerial. By the time he had reached the front porch he decided that it was an eye-sore to the community and when he got inside the house he swore that something would have to be done to keep that young one from tearing the house down regularly every Saturday. But as soon as he opened the door to Jimmy's bedroom he forgot all about these troubles.

"Gosh, Pop, just listen to 'em. Some station I've got, eh, Pop?"

The old man's eyes sparkled as he held the little receiver to his ear and listened to the snappy, clean cut Morse. "Some station, was right," he thought as he reached for a piece of paper and started to copy with the steady flow of the practised telegrapher's hand.

"Supper's ready," called Mrs. Watford.

Not a sound from above.

Fifteen minutes later Mrs. Watford made the announcement that if he didn't come to supper she was going to throw it out.

J. P. said "Damn the supper." Nevertheless he reluctantly went down and raced through the meal.

As soon as he had finished he called up his partner on the phone. "Come on over, Frank, and see my new wireless station."

"You don't say! It works alright then, eh?"

"She sure does. I'm getting messages from all over the country, right upstairs. Come right over and hear them."

Jimmy was already upstairs trying his best to grab a word with more than three letters in it when his Dad came in.

"Let me sit down there and copy. You are not a good enough operator to copy that man at the University."

"Well, I guess I know the code, don't I?"

"If you didn't I'd give you a lickin', but you just need a little more practice, that's all."

"Well I am practicing."

"You can do your practicing when I'm away, Jimmy. And listen, when Frank comes in and I start telling him about this wireless station I don't want you to butt in. Do you hear me? Don't tell your mother but here's twenty dollars. Tomorrow you go down to the lumber yard and get six two-by-fours. I want to put up a better mast. Spend the rest for a better outfit."

A moment later Frank came in.

"Hello Frank," said Mr. Warford, "just wanted to show you what I've been doing with my spare time. Been experimenting a bit with wireless telegraphy. Of course, this is just a make-shift outfit I've got, but it works. Now that I see it's going to pan out alright I'm going into the thing a little heavier. I'm going to have a sending set, too, so I can sit right here and talk to the other stations within fifty miles or so. It's a wonderful thing. Hear that little buzzing noise? That's it. Great stuff, eh?"

"But Dad, you didn't—" said Jimmy.

Mr. Warford gave his son a very penetrating look.

"You see Frank," he continued, "it comes in dots and dashes like this." He wrote a string of dots and dashes on a sheet of paper. "Here Jimmy, see if you can read what I've written down."

Jimmy read:

"YOUR MOTHER WANTS YOU. BEAT IT."

WIRELESS GOSSIP BY IDLE OPERATORS WILL NO LONGER CLUTTER UP THE ETHER

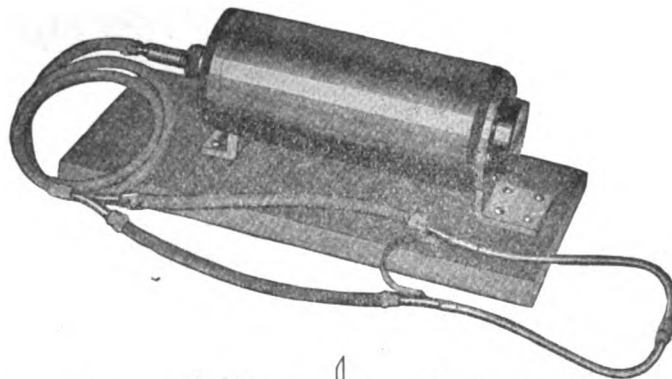
Swapping the gossip of the seven seas, comparing breakfast menus on shipboard and peddling the latest scandal from shoreside may no longer be carried on by commercial wireless operators. This edict has gone forth from the office of Col. J. F. Dillon, radio inspector of the department of commerce, that idle conversation by wireless operators must cease.

A drowsy afternoon on the Pacific may no longer be enlivened by the radio operator's getting into communication with the operator of a liner or tramp and passing an hour or two in exchange of pleasantries or shipboard gossip. Henceforth if any radio operator picks up something delectable ashore at a port to which another operator is bound, said news of said delectable dish will have to be conveyed by other means than wireless.

Delay in the transmission of commercial messages through idle gossip via the ether is said to be responsible for Colonel Dillon's edict.—San Diego Union.

NOSTAT

"Conqueror of Static"



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(QRN) or (QRM)

For sale by Dealers
or direct

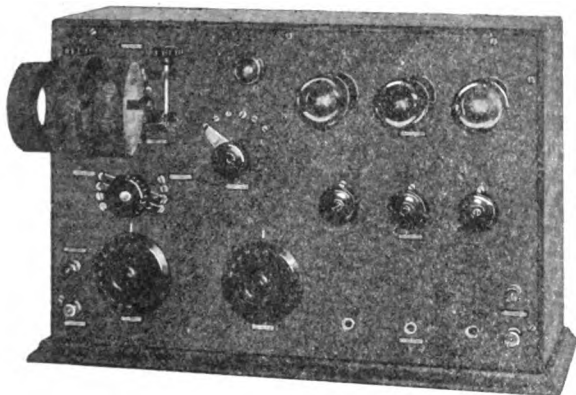


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equipment you can not
afford to be without

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175 to 25,000 Meters

A Complete Short and Long Wave Regenerative Receiver, Detector and Two Step Amplifier



Without a doubt the most efficient Receiver on the market at a price within the reach of all, consisting of Three Coil Geared Mounting, Primary Condenser Switch, Primary and Secondary Tuning Condensers, Grid Condenser, Stopping Condenser, Individual Filament Control, B Battery, Regulation for Detector Tube, Telephone Jacks for Reception on Detector, One or Two Step Amplifier. Complete Set of Sixteen Honeycomb Coils, 45 volt Variable B Battery, in fact a complete Receiver that will outdistance them all on any wave length.

Complete with 16 Honeycomb Coils, 1 Detector and two Amplifier Tubes\$215.00

Complete with Coils less Tubes\$198.00 Cabinet, less Coils and Tubes\$165.00

We carry the most Complete Line of Radio Apparatus and Parts on the Pacific Coast.

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Successors to Haller Cunningham Electric Co.

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These are the three factors which combine to make all the equipment sold by us the best in the market today. A trial order will convince you. Our apparatus is service-tested. Look at the bargains below and then use your judgment.

O

COPPER AERIAL WIRE

50c per 100 Feet

Another large shipment of this excellent solid copper wire has just been received by us. The gauge is No. 14 and the wire runs 80 feet to the pound. We also sell No. 12 gauge at 80c per 100 feet. This size approximates 50 feet to the pound.

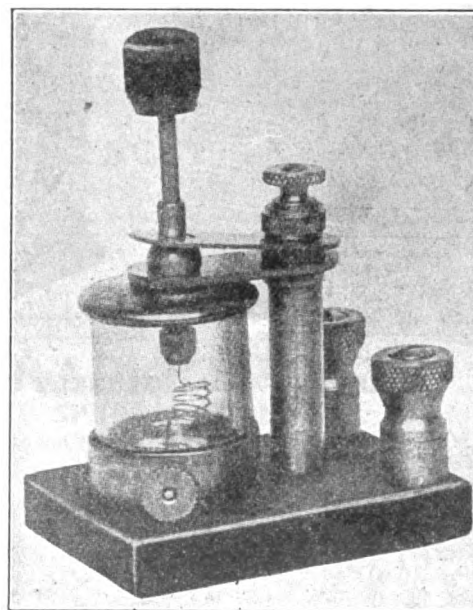
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500 cycle test buzzer—shipping weight, 1 lb.....	\$0.80
75 ohm watchcase receivers—shipping weight, 1 lb.....	1.00
Marconi VT Audion bulb—class 2—shipping weight 1 lb.	7.00
Panel type rheostat—shipping weight 1 lb.	1.00
4 prong VT sockets, aluminum—shipping weight 1 lb....	1.50
Telephone plug and jack—slightly used—shipping weight	
4 ounces—complete	0.85

Cash in registered letter, check or money-order must accompany all orders. If shipment by parcel post is desired include postage, otherwise material will be shipped by express collect.

Our illustrated catalogue of 64 pages is now ready, 15c in stamps will secure a copy. This amount will be credited on your first order for \$1.50 or over.

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Dept. P. R. 48-50 So. Front St., Columbus, Ohio



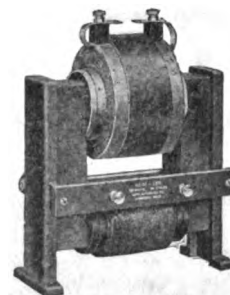
Weather Proof Crystal Detector

The type of the detector illustrated is being sold at prices ranging as high as \$4.50. Our price is \$2.80. This instrument is absolutely dust and moisture proof. The crystal, which is one of galena mounted in a block of Woods metal, is encased within a glass cylinder rendering it impervious to atmospheric conditions. Has ball and socket joint. Shipping weight 1 lb. Price \$2.80.

When writing to Advertisers please mention this Magazine

ACME TESTIMONIAL

ACME 250



Acme 250

St. Louis, Mo., July 24, 1920.

"It may be of interest to you to learn that using one of your 'Baby Acme' 250 Watt Transformers I succeeded in successfully working 5YH, Signal Corps of Camp Pike, Ark.

"He reported the signals QSA through heavy static and QRM and I can corroborate this statement by his letter which I will receive in several days. The transformer was tested at my home and connected with a BENWOOD GAP the radiation being exactly two amperes.

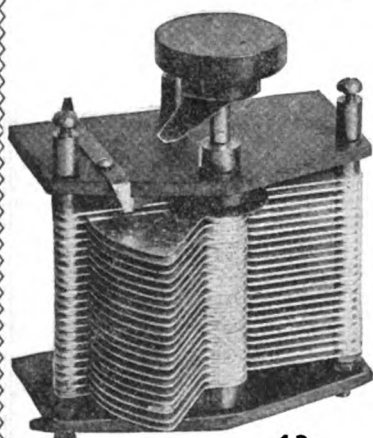
"I think this is excellent work due to the fact that it is mid-summer and hardly possible to work stations 25 miles distant using a one (1) KW installation.

(SIGNED)

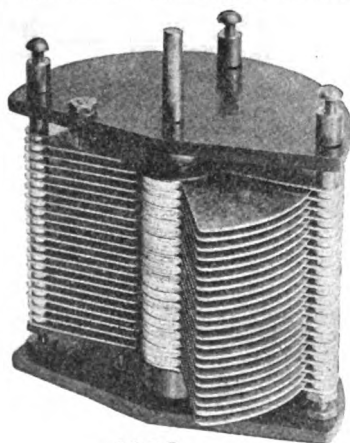
(NAME UPON REQUEST.)

The Distance Covered is 300 Miles.

ACME APPARATUS COMPANY 21 WINDSOR STREET,
CAMBRIDGE 39, MASS.
TRANSFORMER AND RADIO ENGINEERS AND MANUFACTURERS



43



4300

Announcing a New Variable Condenser

Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

REMEMBER—WE ABSOLUTELY GUARANTEE SATISFACTION OR YOUR MONEY BACK.

SERIES "T"			—PRICES—	
No. 20	2 plate	VERNIER	.....	\$2.00
No. 70	7 "	.0001 m.f.	.....	2.35
No. 130	13 "	.0002 m.f.	.....	2.75
No. 170	17 "	.0003 m.f.	.....	3.15
No. 230	23 "	.0005 m.f.	.....	3.60
No. 310	31 "	.0007 m.f.	.....	4.30
No. 430	43 "	.001 m.f.	.....	5.25
No. 630	63 "	.0015 m.f.	.....	7.50

Include postage for one pound

SERIES "L"			—PRICES—	
No. 2300	23 plate, .00075	.....		\$ 6.00
No. 4300	43 plate, .0013	.....		8.00
No. 6300	63 plate, .002	.....		10.00

Either style of condenser fitted with indicating dial at additional cost of 75c.

Include postage for two pounds

The Wireless Shop

511 W. WASHINGTON STREET

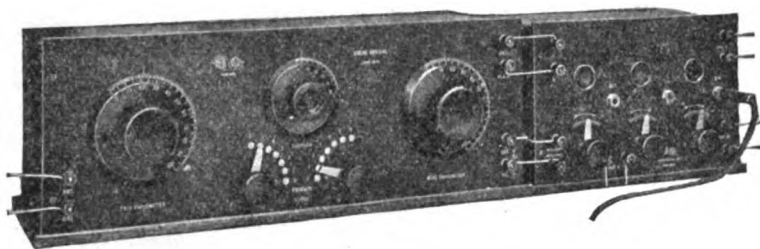
A. J. Edgcomb

LOS ANGELES, CAL.

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A Combination that Can't be Beaten

For Results—real long-distance signals on short wave lengths you can't beat the



This is the Outfit which made a reputation for itself in the recent QSS tests.



Relay Receiver (Type CR-3)
and
Detector and 2-Stage Amplifier (Type RORD)

You can get into the Big Relay Game and become one of the dependable long-distance men with this outfit.

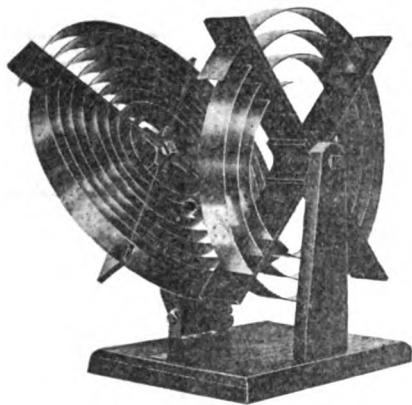
Inspect this Outfit at your Dealer's. If he doesn't carry our line as yet, drop us a postal for catalogue, mentioning his name.

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Central Radio Institute, Independence, Mo.
Continental Radio and Electric Corp., New York
Doubleday-Hill Electric Co., Pittsburgh, Pa.
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The Wesrad Oscillation Transformer

Designed for 200 meter wave lengths and power up to 1 kilowatt, has the following distinctive specifications which make it superior to any other on the market:

INSULATION: Bakelite Dilecto, 1/4 inch throughout. WOODWORK, base and arms: Quartered oak, standard weathered oak finish. PRIMARY: 3 turns of 1 inch heavy brass ribbon. SECONDARY: 8 turns. Shipping weight, 9 pounds. PRICE, \$10.00.

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Established

"For Better Service to the Westerner"

IMMEDIATE DELIVERIES
LEADING MFGRS. PRODUCTS

550 SOUTH FLOWER ST.,
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RADIOPHONE & "CW" ACCESSORIES

Our Rectifier-Transformer outfit supplies 350 V.D.C. to power VT's, and Low Voltage A.C. for heating filaments of Rectifier and power VT's.
Unmounted 50-Watt Rectifier Transformer\$12.00
2 Electrodyne 60-70 M.A. Rectifier VT's 14.00
2 Back Mounting, Non-Melting Bakelite Sockets 2.50
Immediate delivery, include 10-lb. postage charge
Type J. 0-500 Milliammeter, 3-inch dia. Flush Type\$6.00
1 1/2 Henry Closed Core Choke Coil (150 M.A.) 4.00
10,000 Ohm Transmitting Grid Leak 2.25
Send 4c for bulletins describing a new Variable Condenser, and all parts and building supplies for "VT" Transmitters, etc.

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102 Heath Street Somerville, 45, Mass.

PACIFIC RADIO SCHOOL ARC AND SPARK SYSTEMS

THE MOST UP-TO-DATE AND EXCLUSIVE RADIO SCHOOL IN THE WEST. LATEST TYPE POULSEN 2 KW ARC TRANSMITTER AND INDEPENDENT TYPE ONE KW 500 CYCLE SPARK SET.

EQUIPMENT IN ACTUAL OPERATION.

NAVY STANDARD RECEIVING SET WITH AUDION AMPLIFIER.

UNDER THE PERSONAL SUPERVISION OF ADDISON S. MCKENZIE, CHIEF ELECTRICIAN, U. S. N. R. F., FORMERLY INSTRUCTOR AT MARE ISLAND NAVY YARD AND W. A. VETTER, FORMERLY CONSTRUCTION FOREMAN FOR THE MARCONI WIRELESS TEL. CO.

INSPECTION INVITED SEND FOR DESCRIPTIVE CIRCULAR.
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The wireless catalog mailed for 12c and the electrical catalog for 6c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. Everything in wireless worth while is listed in this catalog. The experienced amateur will tell you to see our catalog before buying. You are thereby insured against an unwise purchase. It is the Beacon Light to guide you right in the selection of your wireless apparatus. No bigger or better values are obtainable elsewhere.

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SEVERAL
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FOR
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WORK



SEND FOR CATALOGUE
**BURGESS BATTERY
COMPANY**

HARRIS TRUST BLDG.-CHICAGO, ILL.

LET'S FINISH THAT SONG

ACE

(Continuation of last month's storm.)
Tune—Battle Hymn of the Republic.

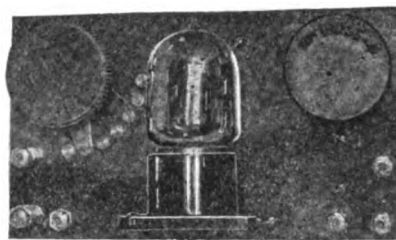
First you write a little letter
It's addressed to Doctor Ace.
You will never find one better
For he always sets the pace.
He will give you all the data
So you may get in the "race."
THEN YOU'LL GET THE
SIGNALS, TOO.

EXPERIMENTERS—Ask your dealer
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DEALERS—You are missing the ACE
line if you fail to have our goods in
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REMEMBER—"You may pay more.
But you can't buy better"

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An Audion Control Panel FOR ONLY \$8.00

CONSTRUCTED OF GENUINE BAKELITE

This panel is equipped with a filament control rheostat, latest model V. T. tube socket, "B" battery switch with large knob, two brackets for securing panel to table, nickel plated binding posts and carefully wired connections.

You cannot buy a better Audion Control Panel. Every panel is fully guaranteed against mechanical or electrical defects. We can supply an adapter for Audiotrons at \$1.50 additional to above price. These panels are specially priced for a limited time.

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2-stage amplifier without detec-
tor\$31.00
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All amplifiers are mounted in oak cabinets. Panels are of polished bakelite. "B" battery supplied with each amplifier. Individual filament control. Nickered fitting, ready for use.

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Transmitting Tubes	7.50	2-step Amplifiers	40.00
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Save Time and Transportation charges in buying from us.

Northwest Radio Service Co.

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CHELSEA

Variable Condensers

(Die-Cast Type)

No. 1.—.0011 m.f. mounted	\$5.00
No. 2.—.0006 m.f. mounted	\$4.50
No. 3.—.0011 m.f. unmounted	\$4.50
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Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large scale reading in hundredths, high amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

VARIABLE GRID LEAK

Permits the selection of the proper leak resistance regardless of the type of tube, or its use as detector, amplifier or oscillator. Ten steps give a range of from 1-2 to 5 megohms. Genuine bakelite base and knob.

All our apparatus embodies the highest degree of mechanical construction, electrical efficiency, and good appearance.

Immediate Delivery—Catalog sent upon request

Purchase Chelsea Apparatus from your dealer

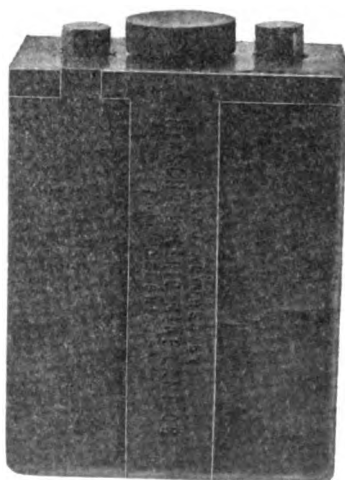


PRICE, \$3.00

CHELSEA RADIO CO.

15 FIFTH STREET
CHELSEA, MASS.

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400 Hirsch Mine Lamp Cells in perfect condition, never been used. Capacity 15 A. H. These cells are, in hard rubber containers and are of very rugged construction.

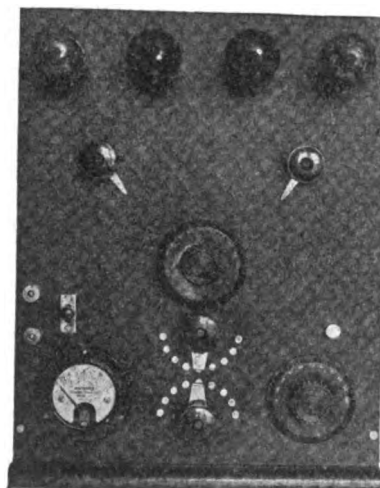
These cells were originally a part of a large Government order and the original quotation was in excess of \$5.00 each.

Three for your filament or twenty for your "B" Battery will solve your

Battery problems for good. Price: Single cells \$1.50. In lots of twenty \$1.35.

Champion Battery Co.

Sales Office 302 Second Ave., North
SEATTLE, WASH.



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Everything
for the
Experimenter

Telephone Transmitter (extension arm)	\$ 4.00
Telephone Transmitter (without arm)	3.25
IT-1 Motor-Generator Set, 250-500 V. A.C., Motor....	104.00
IT-12 Motor-Generator Set, 250-500 V. D.C., Motor....	114.00
IT-3 Generator only	72.00
200 Watt CW Transformer Mounted 525 V. Sec.	22.50
200 Watt CW Transformer Mounted 525 V. Sec.	18.00
50 Watt CW Transformer Mounted 325 V. Sec.	17.00
50 Watt CW Transformer Mounted 325 V. Sec.	14.00
Telephone induction coil \$1.25; 1 MFD Condenser, stands strain of 1,000 volts, \$2.25. Rectifier VTs, \$7.50. Inductance for telephone, 5-inch diameter, tube 14, bare wire, \$6.00. Choke Coils, 1½ Henrys, \$7.00. Meters, Variable Condensers, Sockets, Switches, Dials, Switch Points, Grid Condensers, etc.	

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San Francisco, Cal.

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LEARNERS KEY & BUZZER SETS, \$1.50. Solid brass key, high tone adjustable buzzer. Keys unmounted, 75c. Buzzers, 50c. Postpaid. AJAX ELECTRIC CO., Palmer St., Cambridge, Mass.

STANDARD BAKELITE PANELS, 7-32" stock, 6"x6", 80c—6"x9", \$1.20—6"x12", \$1.55—9"x12", \$2.30—12"x12", \$3.05—12"x15", \$3.75—12"x18", \$4.50—12"x28", \$8.75. Prompt delivery Guaranteed. A. K. LAING, Radio Supplies, Pelham Manor, N. Y.

TYPEWRITER, Remington No. 10 in fine condition. Sell for \$40.00. See MR. SWINDELLE, 50 Main St., San Francisco, Cal.

ACME AMPLIFYING TRANSFORMERS UNMOUNTED, \$4.50. Postpaid to any address in California. RADIO DEVELOPMENT CO., P. O. BOX 2114, San Francisco, Cal.

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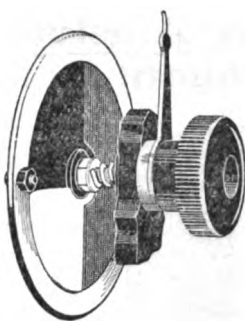
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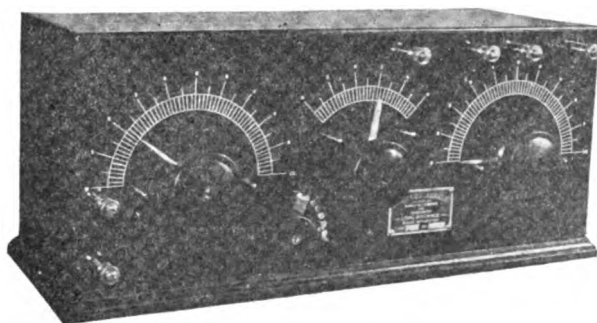
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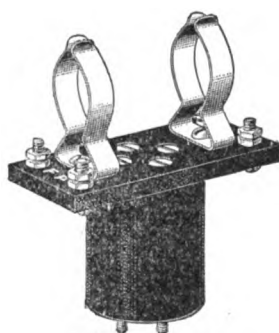
The C. R. L. Paragon can now be used to receive **long wave time signals**. Watch for our announcement of the Paragon Time Adapter next month.

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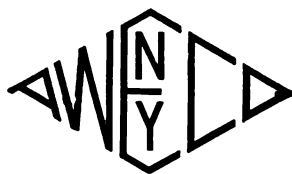
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RADIOTORIAL

(Continued from page 21.)

of us would do that, there would be less "square pegs in round holes." Forget the money side of it, and you will find that it takes care of itself very nicely.

Therefore, if you like the radio game, **STICK TO IT**, and **BOOST** all the time. Look for the best things in the radio game, become satisfied and contented. Make those around you as happy as you are with always a good word instead of a knock,—otherwise **GET OUT** of the radio game!—it is only a place for **GOOD MEN**.

AN EFFICIENT RADIO TELEPHONE

(Continued from page 25.)

and vice versa was established over a distance of ten miles on 400 meters using trailing wire antenna. The receiver was a standard short wave regenerative set in conjunction with a three stage, audio frequency amplifier.

It is important, when using this type of radio telephone where the microphone is inserted directly in one of the circuits, (instead in inductive relation to it), to note that the source of the sound waves with respect to the microphone, has much to do with its successful operation. The change in radiation is almost unnoticeable for various positions of the speaker, but by testing with a receiving station you can readily determine the correct position and volume of sound to use for highest efficiency.

In a series of tests it was found best to talk into the transmitter microphone on a straight line with it, with normal speaking voice and about five inches away from the microphone. A distance of two inches away from the microphone at an angle of forty-five degrees was also found to produce excellent results at the receiving end. However, the experimenter must ascertain for himself which are the best positions for his particular set and which fit the peculiarities of this microphone. It is important to use a low resistance microphone to obtain good results. Two high resistance microphones in parallel do not work nearly as well as a single efficient one.

Figure 4 shows a circuit utilizing an ordinary telephone induction coil and battery. This has been found quite efficient in modulating the continuous oscillations in the telephone transmitter. It has the advantage that a high resistance microphone may be used, provided that the induction coil and battery are of the proper proportions.

When properly set up, insulated well, and tuned precisely to a good antenna, this set will function over really worth while distances; depending on the size or the number of vacuum tubes used.

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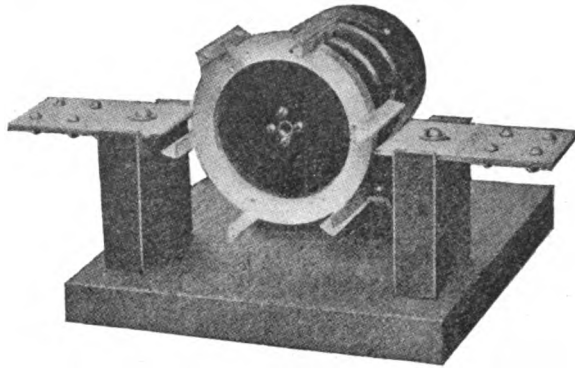
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Binding post made of brass, nickel-plated and polished

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 No. 5—Double Post, $1\frac{1}{2}$ in. high three for60
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 No. 7—Contact Points, $\frac{7}{32} \times \frac{7}{32}$ in. head, with 4-36 screw, Brass, 3 dozen for60
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It weighs but two pounds—size about $4\frac{1}{2} \times 4\frac{1}{2} \times 3$ inches. It has a primary and secondary coil only and receives all arc signals from 5,000 M to 20,000 M. It will not work with a crystal detector. The wiring diagram is on the bottom of each tuner. Do not remove top of tuner or you will destroy it—the coils are waxed in and leads are short. Tests all over the world show this tuner will receive efficiently arc signals on the smallest aerial. We recommend a single wire 25 inches high by 40 inches long. Three variable condensers and an audion are needed for the circuit.

Don't take our word for it—write us for name of nearest Amateur using one; add Parcel Post.

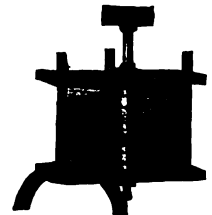
N A A—ARLINGTON TUNER—5,000 M.

This tuner is same size as above tuner only it has a tickler coil and uses the straight audion hook-up with tickler in series with phones. It is the only spark tuner that gets NAA on a small aerial without any variable manual coupling. This tuner also gets the arc signals at 5,000 meters and records easily wireless phone talk from 600 to 5,000 meters. Priced at \$15.00 plus parcel post.

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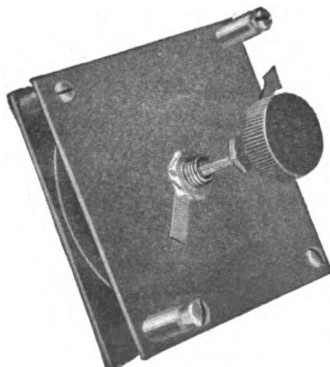
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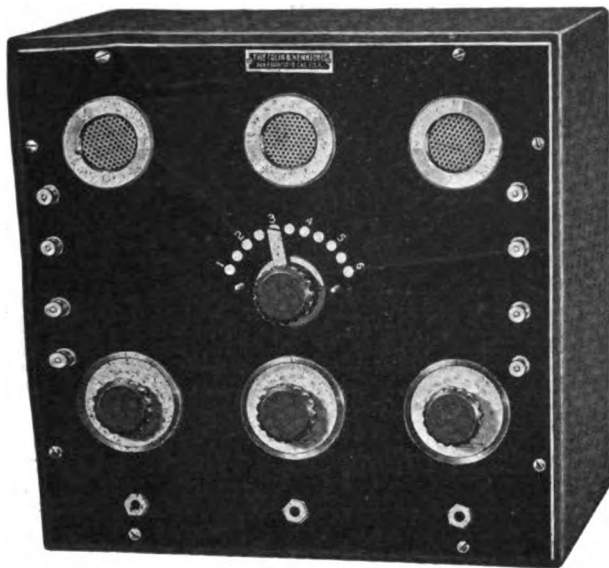
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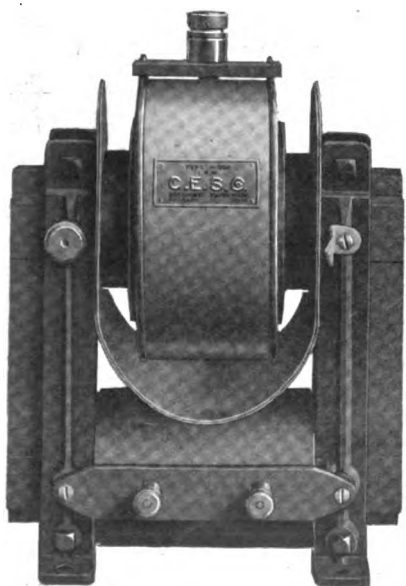
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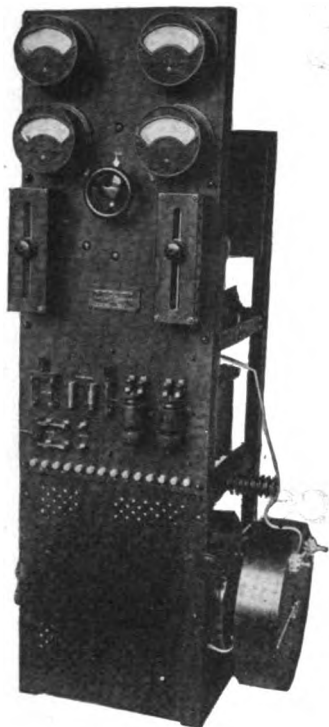
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John Firth & Co.
New York

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Awaiting your circular, I remain,

Respectfully,
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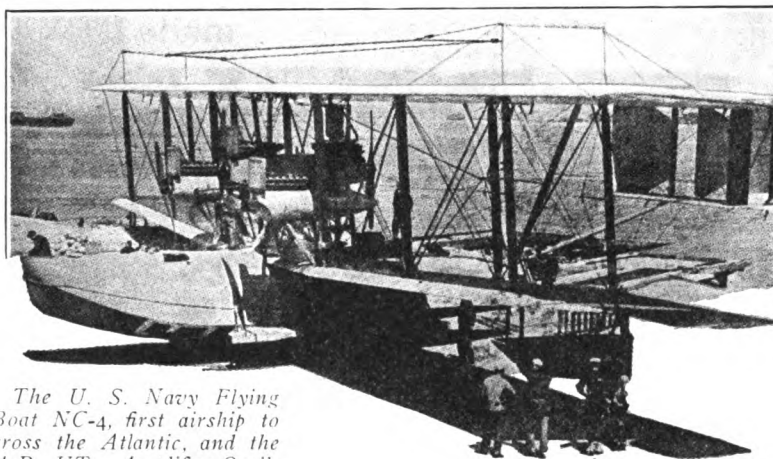
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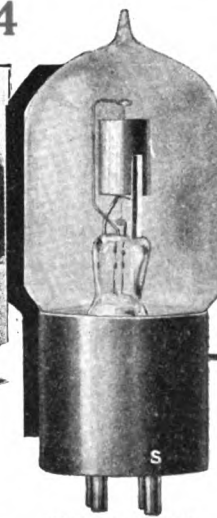
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You will do it——
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Signals which on actual tests are inaudible with any other type of receiver, become easily readable. "Coming from Nothing and amplifying to something."



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**AND HERE IT IS
The Paragon RA-10
Greatest Improvement in Modern Radio**

Do you remember the super-service of the old original Paragon RA-6 amplifying short-wave receiver? This new set surpasses it in every respect.

And the original RA-6 was the only one of its kind.

150 per cent improvement over the old original Paragon, away ahead of all other receivers and excels the most serviceable set on the market today.

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RADIOTORIAL

BY THE EDITOR

WHAT IS THE RADIO OPERATOR?

HERE is a question which has the wide world for an answer, "What is the radio operator?"

There are radio operators in the Navy, there are those in the Army, there are land operators and there are ship's operators, there are amateur radio operators and there are radio operators who experiment with new radio equipment, and so on, down the various tributaries of the radio field, we find radio operators of many and sundry kinds. But let us single out, from among all of these men, the operator who is **THE MOST IMPORTANT**. Now, this is a broad and presuming statement to place on any one of the various classes of radio operators, but we put it without question on the ship radio operator.

Our reason for saying that the ship radio operator is **THE MOST IMPORTANT** is because he is called upon to save human lives when the occasion demands. If any of the other class of radio men can claim the duty of saving human lives (you will note plural: lives) they can then consider themselves upon an equal footing with ship radio men.

It has come before the public eye more and more that the operator on shipboard is the only man who, of necessity, sticks to his post as long as the captain of the ship and in some cases longer. We have in mind a particular instance, where, in mid-Atlantic, the steamship "Denver," of the Mallory Line, called for help. The weather was stormy and the inaccuracy of the position given was about ninety miles. It was during the war and captains were exceedingly suspicious of false SOS signals. If it had not been for the two radio men sticking to their posts till the last, even after the rest of the crew had left, all hands would probably have been lost, as there was a heavy sea and the boats could not have weathered it long. As it was, the sun came out long enough to take a new position, and the operators stuck to their posts until the new position had been transmitted to nearby steamers, with the result that all hands were saved.

The character of the ship's radio operator is important. If his importance demands his maintaining his position in time of emergency, it requires a man of fearless and courageous type; one who will not "fall down" when he is called upon to stick to a sinking ship. If the steamship companies are not willing to maintain men of the type who will stick to the ship in time of peril to the lives of crew and passengers, they are over looking a bet.

But this is not a question which is entirely in the hands of the companies and corporations who control the radio service on ships at sea. Is the government going to stand by and allow men

to be placed in charge of the radio service on board vessels carrying many human lives without even placing these radio men on a par with the third mates?

What is the radio operator? Is he a man who gets a deckhand's salary and does the work of a ship's officer? Is he a man who is forced to check freight or cargo at the end of each trip to make both ends meet? Is he entitled to the knocks and buffets of the crew and officers, and in the same breath, almost, required to save these very men from Davy Jones' Locker? Fairminded humans can answer these questions.

A man, first of all, and a gentlemen. A ship's officer, and a capable one. A man who is ready to remain at his post of duty in time of disaster at sea, to save his fellow man from death. A man, who, through experience gained through the years, is designated by his government license; first, second, third, or fourth grade. A man, who, because his position demands and deserves it, receives a salary more nearly \$200.00 a month than \$125.00. **THAT**, is the radio operator.

WE TAKE PLEASURE IN **ANNOUNCING**

that the first of a series of highly interesting articles on receiving apparatus will appear in the next issue of "**PACIFIC RADIO NEWS**." The author of the series is Mr. Wm. F. Diehl, Chief Engineer of the A. H. Grebe Radio Mfg. Co.

WE FURTHER **ANNOUNCE**

that additional offices of the **PACIFIC RADIO PUBLISHING CO.**, have been opened in the following cities:

New York City....147 Sixth Ave.

Seattle, Wash....419 Pioneer Bldg.

Southern Cal. 432 Palos Verdes St.
San Pedro, Cal.

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARDGOAT ISLAND GETS WIRELESS
From FranceNaval Radio Station Receives Signals
From Bordeaux, 7,200 Miles; Test
is World Record

LINKED with the great 1,000-kilowatt Lafayette station at Bordeaux, France, 7,200 miles away, the naval radio station at Goat Island participated in a series of the most wonderful tests hitherto attempted in the wireless field.

Under the supervision of Commander S. C. Hooper, Lieutenant Commander G. C. Sweet and Lieutenant Commander A. M. Stevens, the station received and recorded a set of previously agreed upon signals, covering four test periods of fifteen minutes each. The object of the test was to establish the efficiency of the Lafayette plant prior to its being taken over by the French government.

The officers in charge declared the test to have been satisfactory in the extreme. The signals were received with an audibility of 100 without amplification, static was 400.

Other stations participating in the experiment were those at Washington, Annapolis, Bar Harbor, Philadelphia, New Orleans, Point Isabel, Tex.; Darien, Canal Zone; San Diego, Puget Sound, Honolulu, Cavite, P. I.; Cordova, Alaska.

Schedule For Tests

According to the arrangements, all of which were carried out without a hitch, the Lafayette call was scheduled to come first. Conventional signals were to follow with sub-tests of four fifteen-minute periods.

The test was scheduled to come at a wave length of 23,500 meters. Chief Electrician Richard H. Fanning was chosen to operate the Mare Island set.

Over the world at the tapping of the key in France, was to be recorded simultaneously the audibility and the clearness of signals. A check was to be kept on wave lengths in receiving.

The success of the big test means France's acceptance of the Lafayette station as it stands. For thirty days the tests will be continued, the last period to cover a five-hour stretch.

In point of equipment the Lafayette station exceeds anything in powerful apparatus in the United States or France.

Americans Built Plant

Its eight 950 foot towers support many miles of copper strands.

The Lafayette station is built on the plan of continuous or undamped wave systems, discovered by science to be the best negotiator of long distance.

It was constructed by American engineers commissioned by the government.—S. F. "Examiner."

ADANISH inventor, Mr. Andersen by name, has devised and exhibited a practical method of transmitting pictures by radio. Photographs were transmitted by land wire from Paris to Rouen fifteen years ago. If Mr. Andersen's invention is practical, the whole future of illustrated journalism will be revolutionized, and photographs taken in the United States will be printed simultaneously in foreign papers with the news which they illustrate.

AVERY compact radio equipment has been developed by an Eastern manufacturer for use on lifeboats. Hitherto, in case of accident befalling a ship, resulting in her sinking, means of communication was destroyed as soon as the vessel went down and very often the ability of sending distress signals ceased some time before the actual sinking of the ship. Many lifeboats have been adrift for days before being picked up by rescuing craft, but future misfortunes of this character will be mitigated by the use of radio.

TWO MORE RADIOPHONE STATIONS FOR SOUTHERN CALIFORNIA

BY the first of October, two radiophones will be installed in Pasadena, California; one at Mt. Wilson observatory, and another at the observatory laboratory in order to effect reliable communication between these two places during the winter months when the telephone lines in the mountains suffer damage from the usual heavy storms.

THE Radio Corporation of America is planning on the erection of ship-to-shore radio stations in Seattle, Los Angeles, Portland and San Francisco. The San Francisco station will be erected at Marshall, California. No attempt will be made to buy the former Marconi stations, taken over by the navy in 1917.

Local mariners, in commenting on the wreck of the Dutch steamer "Arakan" off Point Reyes, California, declare that the vessel would not have hit the beach had the government's new radio compass station been in operation. It was pointed out that the master of the ship would have found his bearings by use of his radio with the Farallon station and that there would have been no mishap.

WIRELESS PUT TO SUPREME WAR TEST

Navy Begins Secret Experiment. Directing
Torpedoes by Radio Believed
Solved

WASHINGTON, Aug. 18.—The Navy Department is conducting a series of experiments by which it hopes to direct the movement of battleships by application of wireless telegraph to the steering gear. Several battleships, including the Iowa and Ohio, are engaged in these operations off Norfolk.

Efforts to direct torpedoes by radio have been tried without satisfactory results. The Navy Department believes, however, that it has hit upon an invention that will bring about satisfactory results. Details will not be made public for some time. Similar experiments are now being made by the English navy.

PHILADELPHIA, Aug. 18.—Carrying out a secret experiment, the control of one large battleship with no person aboard by another warship through wireless, two United States battleships left the Philadelphia Navy Yard and arrived at their manoeuvring position off the Delaware Capes before dawn. The effort to practise war vessel control by radio will be made today.

Coast battleship No. 4, once the Iowa of Spanish-American War fame, will plow through the seas with her engines and helm controlled from the radio room especially fitted on the warship Ohio.

Both vessels have been fitted out for the last two months with secret radio apparatus, under the supervision of John Hays Hammond, Jr., originator of the idea. Manned by a skeleton crew, the Iowa proceeded to the Delaware Capes under her own steam. The crew will abandon the ship, and wireless control of the speed, direction and even the smoke barrage will be instituted.

Meanwhile, the Indiana, sister ship of the Iowa, also a hero ship of the Spanish-American War, is being fitted out with a similar equipment at the Philadelphia Navy Yard, and if the experiment turns out the success it promises to be the surrendered German warships, will also have the equipment installed on them, thus affording the American Navy an ideal opportunity for target practice under war conditions.

—N. Y. "Evening Journal."

Arc Radio Apparatus

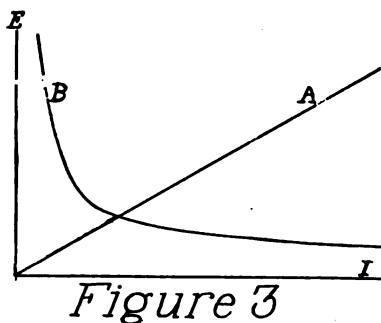
By Jennings B. Dow

Published by Permission of the Secretary of the Navy

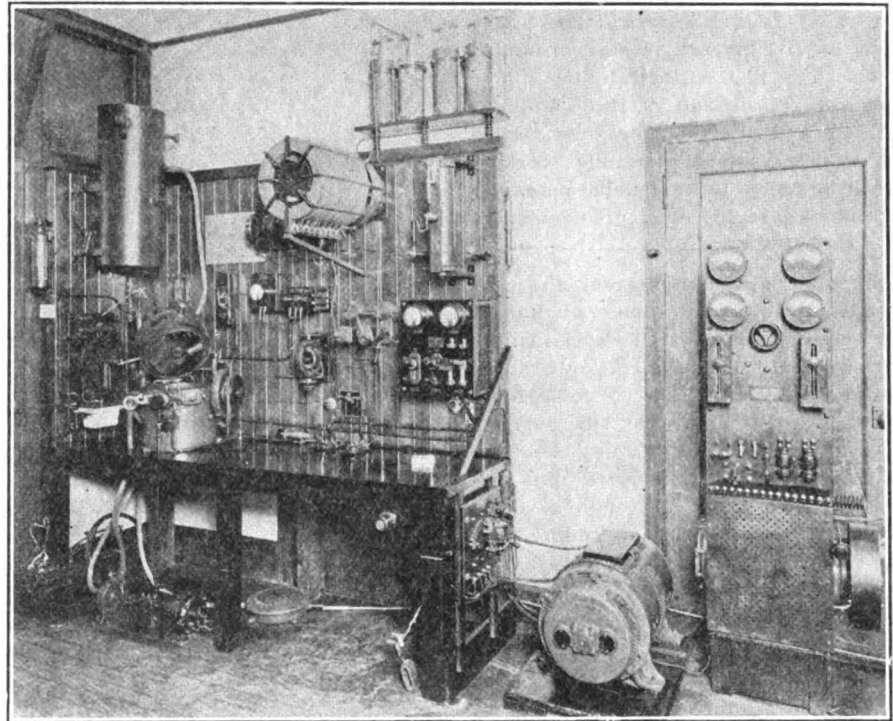
PART II.

(Continued from September Issue)

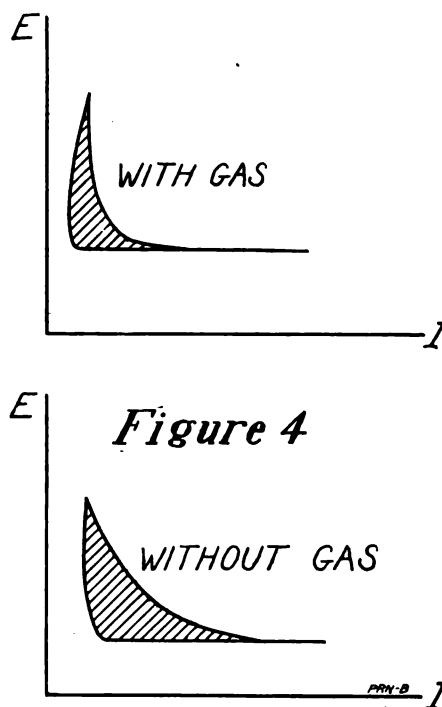
IN order that the condenser will charge rapidly, as high a potential as can be obtained must be impressed upon it, and in order to obtain this high charging potential which is the arc potential, the arc resistance must be great during the charging period. This requires an arc the temperature of which is such that electrode disintegration and the volatilization and distribution of the products of this disintegration by the heat of the arc are reduced to a minimum. To facilitate this a water cooled copper electrode is substituted for the positive carbon of the musical arc. This substitution of copper for carbon plays another important role in the operation of the arc as an oscillating current generator. Almost all electric arcs formed between carbon electrodes possess what is properly termed negative resistance and the extent of this varies with the temperature of the arc and the composition of the electrodes. Just what is meant by this may be seen by referring to Fig. 3. Curve A shows the variation of current corresponding to a variation in applied electro-motive-force which is typical of most conductors. Curve B shows a similar curve which is typical of an electric arc. In the latter case, the first derivative of voltage with respect to current is negative, and this is a necessary condition if the arc is to be used as a converter. Copper has the property of increasing the slope of the curve very materially, which results in a small decrease in current, causing a large increase in voltage—a very desirable condition during the charging period.



A hydrocarbon gas, such as alcohol vapor, administered into the arc has the property of increasing arc resistance also. In doing this, the value, $-dv/di$, is



A General View of the 2 K.W. Federal Arc Transmitter Installed at the Pacific Radio School in San Francisco



the arc, is greatly minimized. Fig 4 shows typical arc hysteresis curves. The shaded areas denote the variation in these losses with and without the use of a hydrocarbon gas.

The magnetic field has the following effect upon the arc: Owing to the presence of carbon particles within the arc, resulting from electrode disintegration and the breaking down of the hydrocarbon gas, the arc may be considered as being made up of a great number of minute current paths all of which must be surrounded by a magnetic field. If the effect of the blow-out coils were not present, these particles would arrange themselves, because of the magnetic moment possessed by each, in a path of least possible electrical resistance between the electrodes. During the process of arranging themselves, each decrease in resistance, however small, would be accompanied by an increase in current, and the magnetic moment possessed by each particle would be further increased, resulting in a continued rearrangement of particles

made still greater. Gas also performs another very valuable purpose, in that arc hysteresis, or loss of power within

(Continued on page 61)

HAND-WOUND HONEYCOMB INDUCTANCES

By C. R. TINSLEY

Instructor of Applied Electricity, Polytechnic High School, Radio Instructor, High School of Commerce, San Francisco

MUCH has been published recently on the winding of the type of inductance commonly known as the "honeycomb" coil, a greater part of which has been misleading, as those who have followed instructions have found out. This article was prompted by the fact that a logical and simple guide for the making of these coils by amateurs and experimenters was needed and is the result of carefully working out in practice those details necessary to producing highly efficient inductances for receiving circuit uses.

The materials necessary for the construction of standard sizes of honeycomb coils are as follows: Paper mailing tube, wooden mandrel to fit into paper mailing tube snugly, Nos. 24 to 28 magnet wire double cotton or silk covered, finishing nails, and for finishing the coils, 6-32 round head brass screws, nuts and washers and some neat tough covering material such as leatheroid, empire tape, etc.

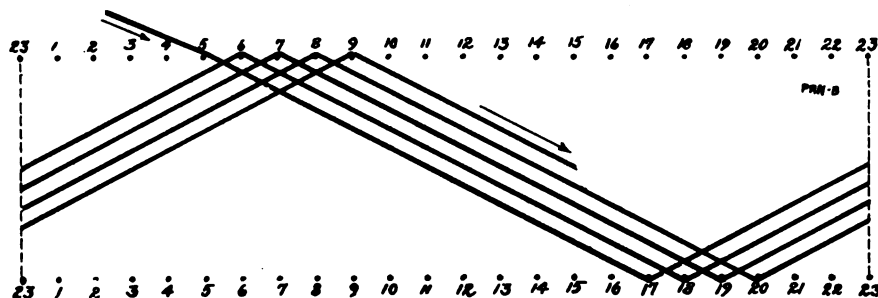


Figure 1.

In order to find the number of spokes to be used, which must always be an odd number, the following formula is employed.

$$(axb) \pm 1 = X.$$

Where X = the number of spokes.

a = the number of diagonals in one turn of wire and b = the number of spokes advanced by each diagonal.

Figure 1 shows an extended winding started, according to formula, where the wires run diagonally twice in one turn and advance twelve spokes in each diagonal. $(2 \times 12) - 1 = 23$.

Figure 2 shows a winding started, where the wire diagonals four times in one turn and advances six spokes for each diagonal. $(4 \times 6) + 1 = 25$.

For coils of large diameter or periphery, use six diagonals. Example, $(6 \times 6) + 1 = 35$ or 37. This retains the right angle cross over to better advantage. Using the above formula, the diamond shaped cells or holes in the finished coils will be perfectly coincident or open and clear all the way from

periphery to core, with no criss-crosses. This is absolutely essential and failure to consider this point will mean "mushy" coils.

Coils may be made of any size but for a guide to making standard sized coils a certain size will be described herewith.

Cut a two inch, inside diameter, mailing tube into lengths 13/16" long. Then, having decided on the number of spokes to use cut a strip of paper 13/16" wide and just exactly long enough to reach around the wooden mandrel, which, as

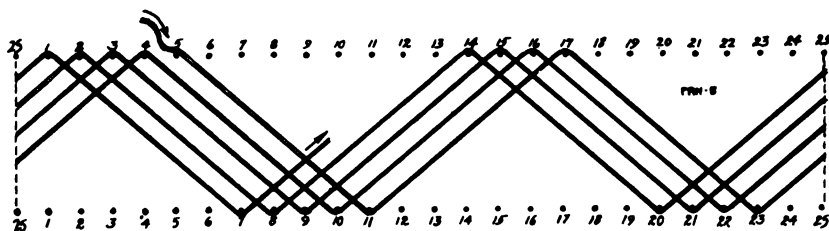


Figure 2.

to a single hub. Pull out one set of spokes and slip on a section of cardboard tube. Replace the spokes, and the coil is ready to wind.

Figure 1 represents the form as it would appear flattened out. Following the winding in Figure 2, the wire is started at any spoke, in this case Number 5, and run diagonally across and around the sixth spoke ahead, Number 11. This process is continued by making another diagonal around spoke Number 17, other side, then around 23, opposite side, and so on.

It will be noted, upon making the first revolution that the wire will go around spoke Number 4, which is one spoke behind the one from which the wire was started. This is called "retarded winding." Had 23 spokes been chosen, on completing one revolution or turn of wire, it would have come out one spoke ahead of the starting point. This is called "advanced winding." Retarded winding will give slightly more inductance for the same amount of wire than the advanced winding.

Upon the completion of one turn of wire the winding is continued without counting, it only being necessary to keep the conductors (wires) parallel. If, at any time, one of the wires crosses one of the diamond shaped cells or holes, a "stitch has been dropped" somewhere.

Having wound the inductance desired the coil may be covered by wrapping tightly with empire tape or leatheroid fibre paper. It may be best fastened with shellac or glue. After a few turns of string are wound around the coil to hold the covering material until the shellac or glue is dry, the spokes are withdrawn and the coil slipped easily off the mandrel. The coil of this type stands a surprising amount of knocking around and abuse without harm.

If the mounting shown in Figure 3 is desired, holes to fit a 6-32 machine screw should have been punched in the cardboard before winding. Before covering, gently press the wires slightly to one side, leaving a clear hole for the screw. The terminals of the coil are soldered to the heads of the machine screw.

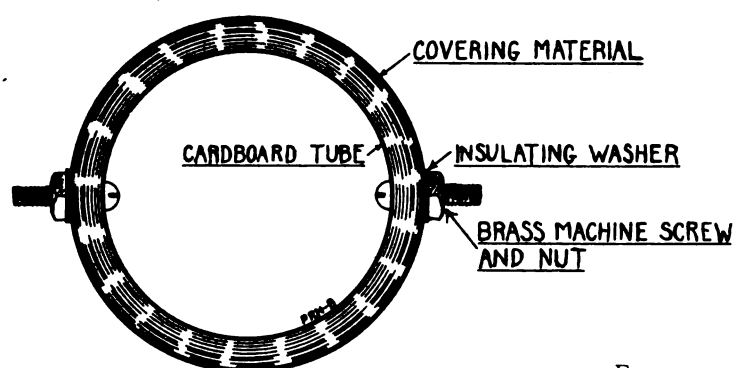


Figure 3.

Another very durable method of mounting coils is shown in Figure 4.

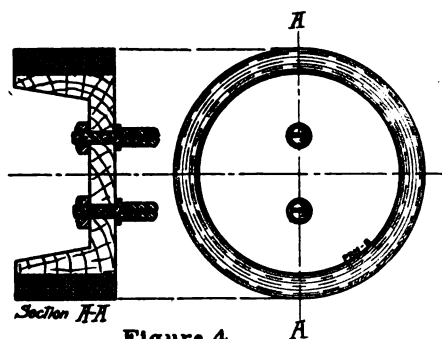


Figure 4.

A hardwood center or hub of the cross-section shown is turned out to fit the cardboard tube on which the coil is wound. The cardboard should be glued to the wooden center piece. The plugs are shown fastened to the hardwood piece. These are to fit into two sockets in the receiving apparatus. This idea makes for speed in changing coils and has been used with much success.

The coils may be arranged so that they are all connected to a control panel or switch so that any one of them may be connected into the receiving circuit without moving them. This method is not to be recommended since in using it, most experimenters would be apt to lose sight of the fact that the inductive dead-end effect of the coils, if they were close together, would decrease the efficiency of receiving. Plugging the coils in separately is the best method; then the unused coils are out of interfering range with the receiving set.

For
Wavelength
of
200 meters
600 meters
950 meters
2400 meters

Primary
Coil of
*2 layers
2 layers
4 layers
12 layers

Secondary
Coil of
3 layers
5 layers
6 layers
24 layers

*This circuit using series "short-wave" condensers. The other three using parallel condensers.

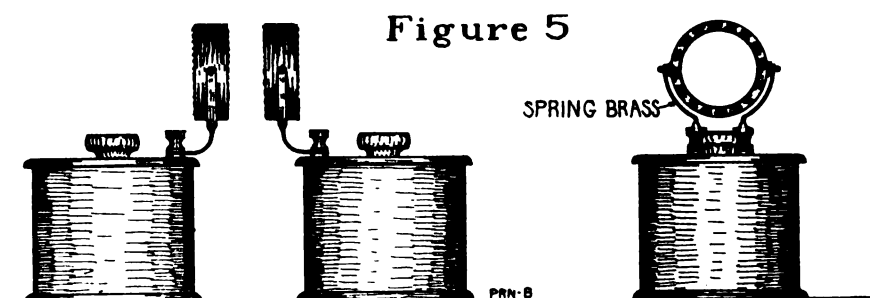


Figure 5



Figure 6.

The "homemade" hand wound coils described in this article have a distinct advantage over the manufactured product as shown by Figure 6. Note the parallel wires at the edge of the machine wound coils. This increases distributed capacity which is lowering the efficiency. Note the hand wound coils with the distinct right angle cross overs tending to secure the very lowest distributed capacity. The distributed capacity is so small with these inductances that 200 meter signals will be heard with some of the larger sizes, with the

condenser at 0°, while from 10° to 180° a most wonderful selection can be obtained.

The coils cost only from four to twenty cents to make as against several dollars for the commercially manufactured product.

Get four of your radio friends to subscribe to "Pacific Radio News" for one year and we will send you a genuine vacuum tube detector. Read the offer on page 61.

MEXICAN GOVERNMENT TO ERECT 30 NEW STATIONS

THE daily press has had much to say of late in regard to the new plans of the Mexican government that call for the erection of thirty high-power and semi-high-power stations in various parts of the rebellious Republic.

Official confirmation has recently been obtained from Washington, according to advices to the Department of Commerce from Trade Commissioner Cunningham at Mexico City. It is estimated that the cost of the new project will

run in excess of \$250,000. It has not been learned what system of apparatus will be employed. The purpose of the new chain of stations is primarily to enable rapid communication between the principal cities of the Republic.

THE UPS AND DOWNS OF RADIO ON THE PACIFIC

BY THE STATIC HOUND

A month ago we heard faint remarks from Sunnyvale, Cal. Last Sunday a noise that sounded like distant thunder was leaking out of the aforementioned metropolis. Mr. Bessey (6BR) say we might expect a real clap of thunder from his wireless plant at any time as things are set to go full blast. After a good tuning of his transmitter, the station will be open for business. We do not quite understand what you mean by that "real clap of thunder," Mr. Bessey. You told us in no too delicate words that you were having trouble tuning your set. We forgot to ask you whether this real clap of thunder would be in the form of wireless waves or cuss words. Make "Mc" our Assistant Radio Inspector, do it, Bessey. Holy Smoke—you know the old saying: No man ever gets fat working hard." Have you seen "Mc" lately? He's falling away to the size of an elephant.

All radio eyes on the Pacific Coast are focused on Mr.—, pardon us, we mean Sergeant Lufkin, Chairman of the Amateur Radio Convention that will be held in San Francisco during the Thanksgiving holidays. Sergeant Lufkin is getting things whipped into shape nicely, and from all appearances the big Convention is going to be a knock-out. Three days of it, too. Oh boy! Good fellows, good speeches, good sight-seeing trips to the various local radio stations, good dancing, good music by radio telephone, good eats, good—good night.

All you radio clubs that have not already written to the Convention Committee had better get busy. Address Sergeant Lufkin in care of the S. F. Radio Club, San Francisco Gymnastic Club, Sutter and Steiner Sts., San Francisco. If you don't belong to a radio club, come anyway. You are as welcome as a static-less night in August. All good fellows will be there, and if you are a good fellow, come. Well, so long, will see you at the Convention.

The Radio Telephone Shop has moved to new quarters at 175 Steuart street, San Francisco. In the very near future a housewarming celebration will be held and "over-the-counter" business will start in earnest. Delays in the arrival of heavy machinery from the East and renovation of the new quarters are holding up the present business.

We have heard many amateurs remark that they hear fellows using call letters other than their own. In the past week the writer has heard two stations using call letters of stations outside the State of California. We would suggest that these fellows get licenses and get them quick. The penalty for operating without a license or using fictitious call letters is enough to make any amateur hold his fingers on his spark gap.

Mr. Edgcomb, owner of the Wireless Shop of Los Angeles, was a recent visitor in San Francisco. Mr. Edgcomb was on a vacation trip, but he carried a few variable condensers in his suit case, besides his collars and shirt. He is taking orders for December delivery at present. He tells us that he will soon be in a position to manufacture variable condensers for radio telephone transmitters.

Just a little hint to those amateurs who contemplate new or additional equipment for the winter work. Get busy right now and get what you can. Place an order for what you want and can't get. "There ain't gonna be" no such thing as running down town and getting what you want when you want it. The shortage of radio apparatus will not be as acute this year as it was last year but at the same time there will be a shortage of good apparatus. The late-comers are going to get what they don't want—in other words they are going to be a year behind the times.

The bankruptcy sale of the Halcun Radio Company was held on September 1. Several amateurs were present, but did little bidding. If the amateurs would have been present in a body with a few dollars in their pockets they could have purchased some real bargains in radio and electrical apparatus. Most of the items that were of use to the average amateur sold for a third of the regular retail price. Among the largest buyers were the Leo J. Meyberg Company, the Radio Telephone Shop, Gray & Danielson Manufacturing Company, Mr. G. Haller and the Federal Telegraph Co.

Concerts by radiophone are transmitted from the California Theatre in San Francisco at the following intervals: Daily, except Sunday, 2:10 PM, 3:55 PM, 7:15 PM and 9 PM. The Sunday morning concerts can be heard from 11 to 11:45 A. M.

6ZE BREAKS RECORD FOR LONG DISTANCE TRANSMISSION ON LOW POWER

Using a power input of only twenty watts and a wave length of exactly 200 meters, Mr. D. B. McGown (6ZE) communicated successfully with 7CU, the station of Royal Mumford, Vancouver, Washington. That this was no "freak work" is evident from a series of tests that led to the raising of the northern station. Mr. McGown's station is located at 1247 Forty-seventh Avenue, San Francisco. The transmitting equipment used for the record-breaking test consisted of the new Cesco 1 K. W. transformer, Dubilier condenser of 0.003 MF. capacity, a 12 plug rotary gap running at a speed of 3,600 R.P.M., a helical type oscillation transformer with one turn in the primary and eight in the secondary, a "T" type antenna with a natural period of 160 meters and a capacity of 0.0006 MF.

Mr. Mumford, upon hearing 6ZE working local amateur stations, gave him a call. 6ZE "came back" on 600 watts, the power that he was using at the time, and then reduced his power to twenty watts. Signals from 6ZE at 7CU were of low audibility on low power but were readable at all times when no local interference was encountered. 7CU was using a single vacuum tube and a regenerative receiver without amplification when 6ZE was heard. The normal radiation of 6ZE with a power input of 600 watts is about 4.2 amperes.

6BN STATION DOES EXCELLENT WORK DURING ENTIRE SUMMER SEASON

6BN, owned and operated by H. Holliway and H. R. Shaw, has communicated with the following: 6AK, 6BQ, 6CV, 7CV, 6DP, 6EA, 6ED, 6EJ, 6ER, 6FE, 6FS, 6GI, 6HZ, 6JD, 6JG, 6JI, 6JJ, 6JM, 6KA, 6KP, 6NY, 6OH, 6QR, and 6UM. The following stations were heard but not worked by 6BN, 6AD, 6AY, 7BC, 6CL, 6CM, 6CQ, 7CC, 7CR, 7CW, 6DK, 7DK, 6EF, 6EM, 6EN, 6FI, 6GN, 6HY, 6IH, 6IY, 6MZ, 6PQ, 6SK, 6TC, 6TX, 6XY, 7YS, 6ZA and 7ZB. A single Audiotron was used in the reception of the stations just mentioned. 6BN has also been heard by the following: 6EB, 6ZA, 6DK, 6SK, 6CM, 6XZ, 6IY, 6AY, 6EN, 6PQ, 6HY, 6CR, 6IL and 7YS.

The temporary call letters of the DeForest radiophone station at the California Theatre in San Francisco are 6XA.

DE FOREST BUZZER RADIO- PHONE OPERATES ON TWO SIX VOLT STORAGE BATTERIES

NO "B" battery is required for the operation of the new DeForest Radiophone. Dr. DeForest, in a recent demonstration of the newly perfected device, has claimed a range of at least ten miles and the speech heard is much clearer than with his well-known 110 volt A. C. set. The device incor-



porates a transformer operated by one of the storage batteries as well as two rectifier bulbs. The transformer differs from the usual spark coil type inasmuch as the vibrator is of a rocker-arm style and two cores are in the transformer proper. When one side of the vibrator is attracted, the other side is away from the magnet. Whereupon the other side is immediately attracted and the first side moves away. In this manner a phase difference of 180 degrees is obtained. Two audion bulbs, which act as rectifiers, step up the current. For transmitting purposes a single bulb is used. The entire transmitter weighs, including two six volt storage batteries, about 60 pounds. It is suitable for use in automobiles, small motor boats, sailboats, camping outfits, surveying and exploration parties, Forest Patrol, or ranches, between farms, etc. The entire outfit can be easily transported on horseback, or motorcycle. It operates with any suitable type of receiver and audion detector; with or without an audion amplifier, depending on the range to be covered and the loudness of reception desired.

"Pacific Radio News" can be bought at news stands in all important cities. If your news dealer cannot supply you, write and give us his name. He will have a copy for you in a hurry.

ANOTHER TRIBUTE TO THE AMATEUR

That the amateur radio man of today does not devote his entire time to cluttering up the ether with unnecessary conversation on a half dozen different wavelengths, and that his sole ambition is not to make more noise than the other fellow, is shown in the form of recent press reports that deal with the disabling of the U. S. Submarine S-5 off the New England Coast on September 2nd.

We publish herewith extracts from the Dayton Journal of September 3rd in which the amateur radio man has received deserving recognition in the daily papers.

UNDERSEA BOAT AND HER LARGE CREW IN DANGER

For 35 Hours Her 24 Men and Six Officers Are Held Prisoners Below Sea in Submersible Off Cape Henlopen—Rescuers Are at Work

HURRY CALL SENT FOR WAR CRAFT TO PREVENT LOSS OF MANY LIVES

Demand for Aid Picked Up on Private Wireless Plant and Same Station Hears Air Is Being Pumped Into Hold of Vessel

NEW HAVEN, Conn., Sept. 2.—A wireless message from the U. S. S. General Goethals, picked up at Farmington, Conn., tonight says the U. S. submarine S-5 has been submerged 35 hours and asks that destroyers be sent to her rescue.

The radio was received by David L. Moore, who has a wireless outfit at his home in Farmington. It read as follows:

"On board U. S. S. General Goethals, at sea, Sept. 2.—Send destroyers with gear to relieve crew in submerged submarine. They have been submerged 35 hours. Bring material for cutting through hull."

From the above it will be seen that David L. Moore has played a valuable part in the rescue of the crew of the distressed submersible. This humanitarian service will undoubtedly be the direct means of adding additional weight to the scales in favor of amateur radio. It shows that we, as amateur radio operators, are taking a keen interest in aiding our government in time of need and that we regard our equipment as something more than a stack of toys. Let's all stick together, fellow amateurs, we are not half as bad as they think we are.

SIXTH DISTRICT AMATEUR STATIONS—Continued.

6ABF	C. S. Smith....	3512 Parl Blvd.....	Oakland, Cal.
6ABG	J. F. Hopkinson...	309 S. Flower St.....	Los Angeles, Cal.
6ABH	G. K. Spencer....	1324 Weber St.....	Alameda, Cal.
6ABI	C. E. Segrove ..	716 E. 22nd St.....	Oakland, Cal.
6ABJ	E. R. Shanpe....	.....	Martinez, Cal.
6ABK	G. Fensky	689 62nd St.....	Oakland, Cal.
6ABL	E. C. Reynolds.....	.....	Paso Robles, Cal.
6ABM	S. March	98 Wilkes Circle.....	Santa Cruz, Cal.
6ABN	R. C. Saunders...	1528 Cambria St.....	Los Angeles, Cal.
6ABO	E. E. Smith.....	537 N. Greenleaf Ave....	Whittier, Cal.
6ABP	R. C. Anderson...	1919 Lime Ave.....	Long Beach, Cal.
6ABQ	C. Schneider	76 Caselli Ave.....	San Francisco, Cal.
6ABR	S. Inselman	57 Douglas St.....	San Francisco, Cal.
6ABS	N. Ashima	1474 Nuuanu St.....	Honolulu, T. H.
6ABT	J. D. Shea.....	5158 Birch St.....	Oakland, Cal.
6ABU	A. Stokes.....	2812 35th Ave.....	Oakland, Cal.
6ABV	E. J. Conroy....	3650 Penniman Ave....	Oakland, Cal.
6ABW	W. B. Donnewith...	1235 Weber St.....	Sacramento, Cal.
6ABX	W. Huston .....	.....	Woodland, Cal.
6ABY	G. S. Clark.....	127 N. H. St.....	Imperial, Cal.
6ABZ	F. S. Hannah.....	.....	Puente, Cal.
6ACA	C. R. Henry.....	26 3d St.....	Napa, Cal.
6ACB	M. P. Gilliland...	117 Foothill St.....	Pasadena, Cal.
6ACC	W. D. Johnson...	4346 Townsend Ave....	Oakland, Cal.
6ACD	A. L. Walker....	6th & Lay Sts.....	Winnemucca, Nevada
6ACE	W. H. Westerman...	3219B Adeline St.....	Berkeley, Cal.
6ACF	E. Pack	6451 San Pablo Ave....	Oakland, Cal.
6ACG	M. H. Hurt.....	289 W. 14th St.....	Riverside, Cal.
6ACH	C. E. Thompson...	1876 15th St.....	S. F. (Portable Sta.)
6ACI	I. A. Coffey.....	75 E. Santa Clara St....	San Jose, Cal.
6ACJ	M. H. Hurt.....	289 W. 14th St.....	Riverside, Cal.
6ACK	L. H. Atkinson...	1306 Fillmore St.....	San Francisco, Cal.
6ACL	A. Brooks	432 Lyon St.....	San Francisco, Cal.
6ACM	L. Newman	1700 Sonoma Ave.....	Berkeley, Cal.
6ACN	R. W. Kerrigan...	2843 Harrison St.....	San Francisco, Cal.
6ACO	H. C. Robom....	2069 O'Farrell St.....	San Francisco, Cal.
6ACP	R. K. Salisbury...	400 Wilcox Ave.....	Oroville, Cal.
6ACQ	H. W. Scribner...	23 Presidio Terrace....	San Francisco, Cal.
6ACR	T. A. Work, Jr....	181 Central Ave.....	Pacific Grove, Cal.
6ACS	H. F. Thornton...	.....	Arcata, Cal.

A SHORT-WAVE REGENERATIVE RECEIVER

By T. LAMBERT,
Manager The Radio Shop.

While many so-called portable receivers have been described from time to time in various periodicals, it appears that in many of the designs offered only one factor was considered, namely, compactness.

This, of course, is a very important and desirable feature, but what advantage is gained if efficiency is sacrificed? It is true that the component parts of a modern radio receiver can be compressed into a minimum of space, but when this is done without regard to the many unwanted "feedback" effects possi-

ble and can be best worked out by the builder of the apparatus. The author has learned, from experience, that the average amateur constructor, when given the location of the various units, can best work out the smaller details to his particular taste and pocketbook.

The greatest stumbling block seems to be in arrangement of panels. Usually this is done in a "haphazard" fashion with no thought of what will occur in the interior of the set when the various units are assembled in their intended positions. For this reason the drilling dimensions are given.

The arrangement of controls is as follows:

Upper left and right, detector and amplifier rheostats respectively.

Center left, high tension battery control, as described.

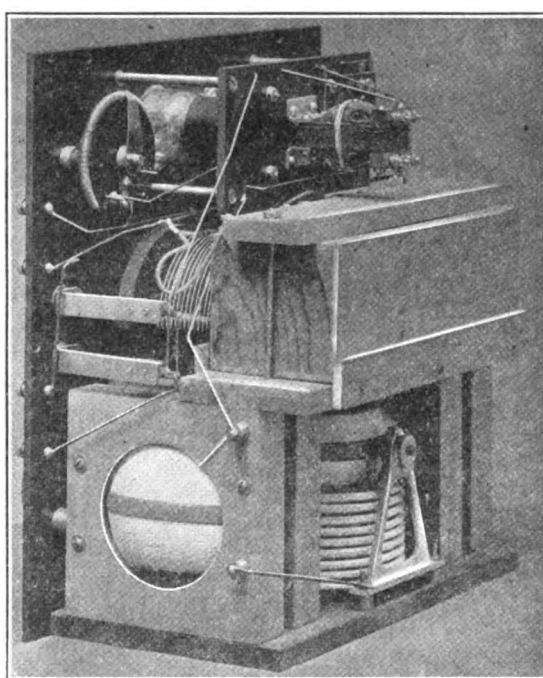
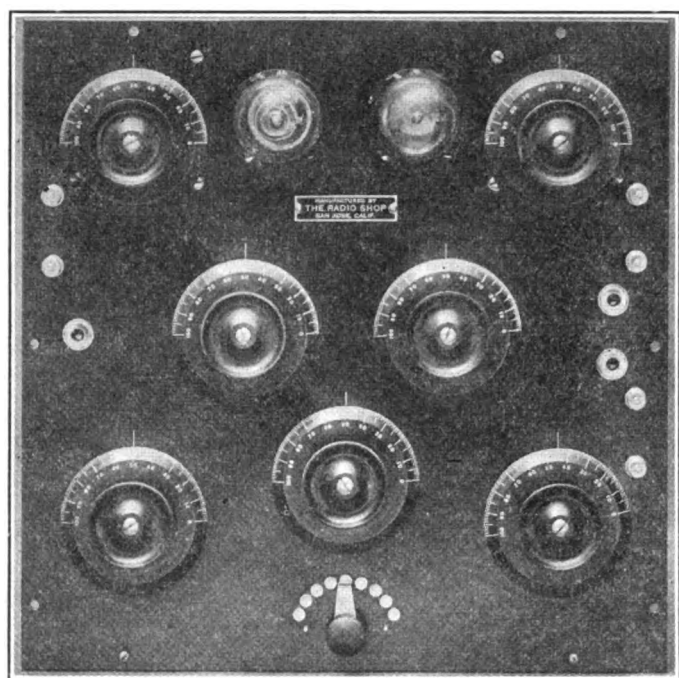
Center right, Antenna series condenser.

Lower left, Plate Variometer.

Lower center, vario-coupler.

Lower right, Grid variometer.

Three telephone jacks are employed, the plugs being connected directly to the telephone cords. The single jack to the left is for detector only. The



ble in vacuum valve circuits it stands to reason that the best results will not be obtained. And as the portable receiver usually operates under the handicap of a limited antenna, it is most assuredly essential that we endeavor to eliminate all detrimental features.

Therefore, the author desires to offer a suggestion of arrangement for a receiver which is adaptable to portable duty and at the same time possessing design for the best possible efficiency. This apparatus was built for one of our most exacting Western experimenters,* expressly for automobile duty, but has proven so pleasing of design and efficiency that it is now doing duty as one of the regular receivers in his experimental station.

It is not intended to give detailed specifications for construction. This has been found impracticable. The material on hand will govern the smaller details

Close scrutiny of the photos will reveal that practically everything entering into the construction of the sets is composed of standard parts available on the market. The only machine work required is that on the panel, high tension control switch, and the valve mounting. This simplifies construction for shops with limited tool equipment.

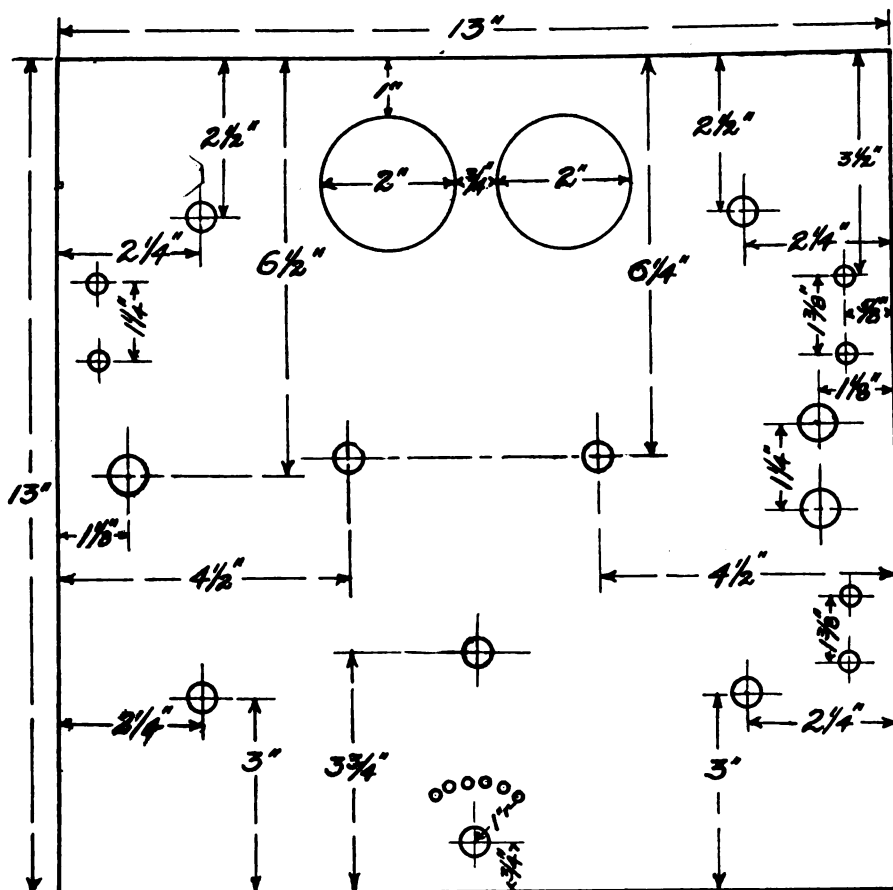
All controls, with the exception of the primary inductance switch, are by means of graduated dials. Not only is this method applied to variometers, vario-coupler, rheostats, and variable condenser, but also to the high-tension battery control switch. This latter is accomplished by mounting the contacts on a sub-panel with such spacing that connection is made to "live" points when the dial indicates 20, 40, 60, 80 and 100. "Dead" points are interposed to insure a smooth running switch.

two on the right are for the amplifier and are merely connected in parallel with each other to allow the use of an extra pair of telephones.

Reference to the rear view photo will give a good idea of the method employed for mounting the valves. The sockets are mounted on the sub-panel, which, in turn, is arranged at such a distance behind the main panel as will allow the valves to project just sufficiently far to permit grasping with the fingers for removal. This sub-panel also mounts the amplifying transformer and fixed grid condenser for the detector tube.

The variometers are attached to the panel by means of screws from the front and also up through the bottom sub-base, which also holds the vario-coupler in position. The photo shows a special bank winding on the coupler primary. This has been found unnecessary.

*Mr. A. E. Bessey, Sunnyvale, Calif., Radio 6-BR.



PANEL DRILLING DIMENSIONS

A small shelf across the top of the variometers provides a space to mount a standard 45-volt "B" battery. This is securely clamped in place by means of a wooden piece across the top, bolted through to the shelf.

Binding posts are arranged at the left for connection to antenna and earth. The uppermost pair of the right are for the introduction of an extra plate battery when extremely hard amplifying valves are employed. The lower right hand posts connect to the filament battery.

Wiring of the set is by means of No. 14 hard drawn copper throughout with the exception of the plate battery leads. These are of flexible telephone cord, fitted with connection lugs.

For portable use the complete set is housed in a heavy box with inside dimensions to fit the panel and seven inches deep. A cover two inches deep is sufficient to clear all controls and also provides a space for tuning data, calls, etc.

For use on the experimenter's table a nicely finished mahogany cabinet will give a pleasing appearance.

RADIO EXPERT DOUBTS THAT CALIFORNIA AMATEURS CAN REACH HAWAII

In the July 1920 issue of "Pacific Radio News" we published an account of amateur radio stations heard in Hawaii. Several weeks later we received a letter from the Expert Radio Aide at the Pearl Harbor Naval Station wherein he states that the leading article of our July issue is an absolute "fable." Only a few days ago the operator of the S. S. "Brookdale" reported to us that not only California amateur stations are being heard in Hawaii but stations in Washington and Idaho are being heard as well.

We publish herewith the letter received from Mr. T. Hall, the first Honolulu amateur who has succeeded in copying signals from the sixth and seventh district stations:

THE BLAISDELL HOTEL
Honolulu, Hawaii

April 9, 1920.

Dear Dickow:

I am looking for information which, no doubt, you can supply. Is there a California amateur station that signs 6EA, also a station that signs 7GB or 7GC? I have read 6EA here on 200 meters using an eight stage amplifier and he "came in" with an audibility of from 4 to 7. This constitutes a readable signal.

We are in the thick of the game here now and we have the agencies for several radio manufacturers.

I have just fitted out the "KH" stations here with DeForest tuners, audition panels and two stage amplifiers,

including your old station at "KHK." Let me hear how the game is in California and tell the gang that "IAL" is going strong.

We have a 700-foot aerial on the Young Hotel building and we will soon install a 2 K.W. DeForest Radiophone set. Some of your long distance men might "listen in" for me during the next few months. Aloha from "HU."

T. C. HALL.

Mr. Mulrony, the expert Radio aide, has this to say in regard to the account:

U. S. Naval Station,
Pearl Harbor, T. H.
July 6, 1920.

My Dear Dickow:

I have received the copy of your July, 1920, "Pacific Radio News." I feel sure that your leading article is an absolute "Fable" about these Seefred Brothers communicating with Hall.

There are many reasons why this was not done on 200 meters and 500 watts. You ought to encourage amateurs to establish real direct communication between Honolulu and the Coast.

At present all three high power stations are in operation; at least one is working at all times and we, of course, know what the local interference from induction in the Young Hotel building amounts to. NPG cannot be read there, only under great difficulties—so such nonsense as this article should not be encouraged. Your paper ought to offer a reward for the first amateur who can successfully send a message to the Hawaiian Islands. I am seeing Hall today with intentions of challenging this article and "bawl him out" for trying to spoil a good game.

If some good live amateur over there wants to have a go at trying to work across the Pacific I can arrange to "listen in" as an amateur myself and have several others do the same. All transmitters on the Island will be silenced for the test. We will then have a pretty good chance to hear the California amateurs.

With best wishes and kind regards,
M. A. MULRONY.

Well, boys, who wants to get in the swim and work Honolulu with every arc on the Island shut down for the test? We are going to arrange a schedule with Mr. Mulrony if the necessary cooperation is received from amateurs in the sixth and seventh districts. Send us your application to partake of the test and we will ask Mr. Mulrony to listen for you. Substantial prizes will be awarded the winners of the contest.

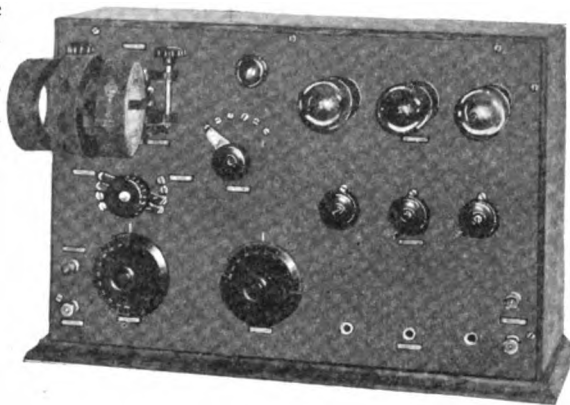
RADIO DEVELOPMENT & STANDARDIZATION

A COMPACT LONG AND SHORT WAVE RECEIVER

Mr. S. N. Petersen, manager of the Leo J. Meyberg Company of San Francisco, has developed a combined long and short wave receiver, detector and two step amplifier. The wave length range of the new receiver is from 175 to 25,000 meters and by means of a plugging arrangement the receiver is made to function on either a vacuum tube detector circuit or as an amplifier of one or two steps. A three-coil mounting for honeycomb inductances is provided and a set of 16 honeycomb coils is supplied with the set. The receiving range of this new instrument is practically unlimited. During a recent four hour test the following stations were heard: YN, POZ, LAF, NPO, NPM, NPH, NBA, NFF, NSS,

NPP and others too numerous to mention. The radio telephone at Avalon, Catalina Island, can be heard in San Francisco at all hours of the day.

Dead-end losses are eliminated and all tuning is done with variable condensers and coupling adjustment. The receiver is mounted in a quartered oak



cabinet, 13-in.x18-in.x6-in. The wiring is of switch board bus bar type.

A purchaser of one of the new receivers states that he copied the following stations in Honolulu, where his receiving apparatus is located: NPE, NPD, NPB, NPF, NPG, NPX and NPL. All stations heard were transmitting on a 600 meter wave and the distances vary from 2,000 to 3,000 miles. The Canadian stations (VAK, VAE, VAF) were also heard with good audibility. Ships 4,000 miles at sea were also copied in Honolulu.

A NEW GRID LEAK

The Radio Telephone Shop has perfected a new grid leak of novel constructional design. It can be mounted on any vacuum tube panel with ease.

THE RECEIVING APPARATUS USED ABOARD SHIPS CONTROLLED BY THE INDEPENDENT WIRELESS TELEGRAPH COMPANY

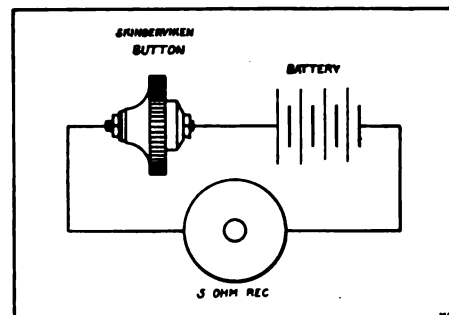
The illustration shows an efficient and compact receiver manufactured by the Independent Wireless Telegraph Company of New York. Over 100 vessels have this type of receiver installed and sharp tuning as well as compactness are its outstanding features. The lower portion of the cabinet is provided with two drawers for holding miscellaneous small spare parts. The Independent

Wireless Telegraph Company is one of the largest marine radio companies in the field today.



placed. The conical construction of both electrodes of the button allows a larger contact surface for the variable resistance material used, thereby allowing no particle of same to be idle when the button is placed into vibration. It can therefore be readily seen that there is no possibility of "packing" of carbon in the button—a very important feature.

The adaptability to expansion and contraction is another feature as it prevents the familiar heating of a transmitter while in use.



A NOVEL SOUND DETECTING DEVICE

The General Sound Transmission Corporation of New York, sole manufacturers of the Skinderviken Transmitter Button, announces that the new device can be used to exceptional advantage in Radio Telephony. The button is also valuable in detecting bad bearings on an electric motor or for discovering the missing cylinder of an automobile engine.

The only operation necessary for detecting faults is to place the rod of the instrument on the faulty apparatus or machinery. The device is extremely sensitive. The tick of a watch can be heard distinctly by touching the button to the back of the case. As a matter of fact, any fault can be detected in moving parts of motors or other machinery.

The design of the button is such that it will not be rendered inoperative regardless of the position in which it is

The accompanying diagram shows the new Skinderviken Mechanical Stethoscope. It will be seen that the instrument consists of a Skinderviken Button, dry cell, low resistance receiver and the necessary connecting cords. Due to the portability of the device it can be carried in the pocket and is of much value to the "trouble shooter." A stethoscope for medical purposes will soon be developed by the manufacturer.

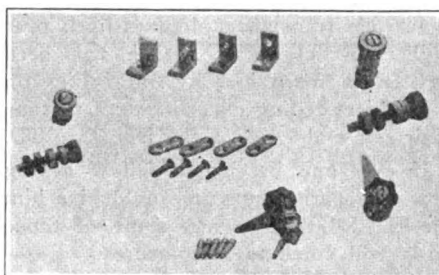
STANDARDIZED MATERIALS FOR RADIO APPARATUS

THE new line of standardized raw material products, including cabinets, panels, knobs and dials and small parts, as announced by the American Radio and Research Corporation, is particularly interesting to the operator who builds his own apparatus. This equipment has been designed, it is said, so that an operator desiring to make one piece of apparatus and then purchase another may build an article that will closely resemble the completed Amrad Unit which he may wish to add to his set at a later date. That is, an operator may begin with two or three simple units and, at very slight expense, add other units as he wishes, at all times preserving the neatness and uniform appearance of the entire set and also obviating the necessity of any special construction work.

Among the three types of cabinets now available is a 10-in. x 10-in. x 10-in. size with a removable front. This construction makes the Cabinet adaptable for a complete receiver, VT amplifier or CW transmitter units for either stationary or portable purposes. This model is designed to receive the standard 10-in. x 10-in. Formica panel, furnished separately or two of the 10-in. x 5-in. Cabinets or four of the 5-in. x 5-in. Cabinets, which may be mounted flush or below flush as desired.

The two smaller models, both 6¼-in.

deep are furnished complete with standard 10-in. x 5-in. or 5-in. x 5-in. panels already attached. The same panels undrilled are also furnished separately. All the cabinets are rigidly constructed of first grade Chestnut and given a smooth, natural gloss finish, which in addition to the attractive appearance, insures that Cabinets purchased at different periods will exactly match. If preferred, the constructor may give the Cabinets any special finish desired without difficulty.



Of equal interest is the new Amrad Knob and Dial. The latter is made of a non-magnetic alloy, which, in addition to its durability, acts as a shield from the capacity effects of the hand when adjusting the apparatus. The design is such that the dial is always insulated from actual electrical contact with any part of the circuits. It will be noted that the Amrad Knob and Dial is the first indicating device of its kind designed to be turned in a clockwise di-

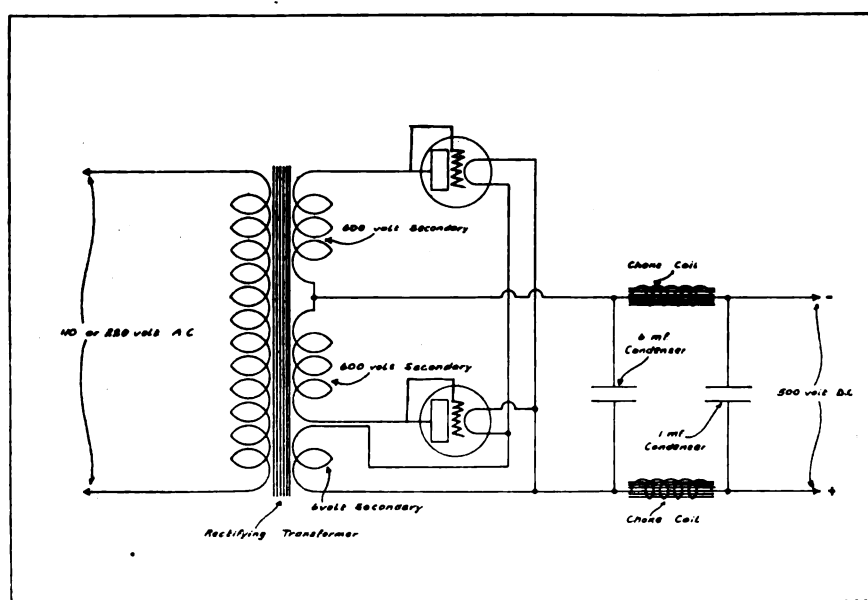
rection for increase of current, capacity or coupling. This will be especially appreciated by those accustomed to the confusion which results where this detail is not standardized.

The Amrad Knob, which also can be obtained separately, adapts itself to all sorts of construction with equal facility. A long, round head 8-32 screw may be secured to the knob through the threaded upper portion if desired. As in the case of the dial, the shank of the knob is drilled to pass standard ¼-in. shaft, a set screw threaded through the shank securing the connection.

The Amrad Switch Knob is designed for use where space is a factor. Contact points are also listed. The high quality binding posts used on all Amrad equipment will be available everywhere soon. These have non-removable tops and like all other metal parts are finished in dull nickle.

All the parts, panels and cabinets are identical to the stock that will be employed in the manufacture of standard Amrad Receiving Units which are now in the final stages of development. By means of simple connectors, supplied at a nominal cost, any number of the 10-in. x 5-in. and 5-in. x 5-in. cabinets may be fastened rigidly together as a single unit and thus effect a very attractive, efficient and economical set until such time as the complete Amrad Unit may be desired.

HOW TO USE A TRANSMITTER TUBE FOR RECTIFYING PURPOSES



THE Pacific Radio Supplies Company, distributors of the A-P tubes, announces that the A-P transmitter tube is well adapted for a rectifying circuit, provided that the grid and plate of each tube is connected together as shown in the accompanying diagram.

COLIN B. KENNEDY RECEIVING SETS DOING GOOD WORK

S. F. Nielsen, radio operator on the S. S. NEWPORT, reports the reception of signals from Nauen, Germany, off the Mexican Coast with the use of a Colin B. Kennedy receiving set. The receiving was accomplished without any means of amplification.

Signals from Cavite, Lyons, Bordeaux and Rome were also heard with good audibility during the entire cruise along the West Coast as far south as Panama.

A-P VACUUM TUBE CIRCUITS

For the benefit of our readers who desire to experiment with various hook-ups of vacuum tube apparatus we will publish a monthly diagram of the best circuits available. The diagrams have been selected by the Pacific Radio Supplies Company and cover the use of vacuum tubes in both transmitting and receiving circuits.

THE EDITOR'S MAIL BAG

OUR READERS ARE INVITED TO SEND CONTRIBUTIONS FOR PUBLICATION IN THIS DEPARTMENT

San Francisco, Cal.,

September 4, 1920.

Editor, "PACIFIC RADIO NEWS,"
San Francisco, Calif.

Dear Editor:

This is an opportune time to publish the following paragraph taken from an article about the S. S. "Arakan" that recently went ashore at Point Reyes. It appeared in the S. F. "Chronicle" September 2nd, page thirteen, column three.

"Radio Inspector of the Department of Commerce has been unable to locate the wireless operator who insisted on testing his apparatus Sunday, while the "Arakan" was trying to send out an SOS call. The testing was heard at the Department's office in the Custom House but there was no clue to the operator."

What I would like to know if it was one of those "air hogs" I heard Sunday morning. In fact, testers were going all day Sunday. Most testing was absolutely unnecessary. Such a show of thoughtlessness and selfishness * * I sincerely trust that the offender in the above case will be located and substantially punished. A good, stiff Editorial on unnecessary testing would, or should, bring some of these young gentlemen to realize that there are others who have to listen to their testing or prattle. I am one of the many who amuse themselves with radio and who is interested in the study of it. I have no transmitting set, but have often thought that I would get one for self protection, to get some of those chaps who are now getting me.

If you could explain to these fellows, through the columns of your valued paper that there is more fun and amusement tuning for distances than talking to their next-door neighbor and at the same time spoiling an evening for someone else. I think everybody would be better satisfied.

Sincerely,
Ed. Newall.

San Francisco, Cal.,
September 1, 1920.

The Editor,
"Pacific Radio News",
San Francisco, Cal.
Dear Ed:

I do not want to appear as a kicker or an old grouch, but I have something very heavy on my chest and I must get it off. It is about these chronic QRM? hams. "How do I come in today?" "This is low power—this is full power." "Do you get me as loud as 6—?" etc. The extent of conversation of at least half of the amateurs that I

have heard in the last three days has been relative to their sets. Why, if this is all that they can talk about why don't they quit worrying by getting out of the game?

This small-league stuff can be expected from beginners but when I "listen-in" and hear the old-timers of five or six years experience pull that stuff, it makes my blood boil. One would think that a wireless transmitter detunes itself over night. Article after article has been written in magazines by authorities on the subject telling experimenters to tune their sets and LEAVE THEM TUNED.

If everyone hearing a fellow asking how his spark comes in would give him the HI HI, believe me, some of those birds will come to their senses.

Give them a little spiel on this subject in your paper. It will help a good cause. Distance is starting to come in fine these days and if a little more listening rather than sending is done, many long distance records will be broken.

With best wishes to the success of the "PRN", I am,

Yours very sincerely,
"KICKER."

Many letters have been received by us of late on the QRM question in and around San Francisco. The two letters published in this issue are examples. We know that the radio club in Oakland is making a strong stand against this kind of interference and in a short while the San Francisco Radio Club will take a like hand in the matter. Instead of waiting for the drive, why not start in right now, and, as "KICKER" says, "Give some of these interferers the HI."—Ed.

RADIO TELEPHONE SET OF 6UV HEARD 850 MILES WEST OF SAN FRANCISCO

Radiating only .4 ampere, Mr. A. F. Pendleton (6UV) has succeeded in transmitting speech and music to a vessel 850 miles out of San Francisco. Pendleton also reports hearing the following sixth and seventh district stations: 6AJ, 6CM, 6CQ, 6CV, 6DP, 6EA, 6EB, 6EM, 6ER, 6FE, 6FI, 6FS, 6GR, 6GQ, 6HY, 6JD, 6JI, 6MZ, 6OH, 6PQ, 6UM, 7CW, and 7CC. Stations worked include 6AK, 6BQ, 6EJ, 6JM, 6KP and 7CU.

Every amateur needs two items of importance in order to have an efficient station. These items are a vacuum tube and a subscription to "Pacific Radio News." We will give you a tube free of charge if you subscribe. Read the offer on page 61.

BAY COUNTIES RADIO CLUB HAS NINETY MEMBERS

After an adjournment of several weeks, due to the vacation season, the Bay Counties Radio Club has resumed its former activities. Meetings are now held in a large hall at 59th and San Pablo Ave., Oakland. A drive to eliminate "QRM" is contemplated and many circular letters have been sent to the Bay District amateurs. The following schedule has been suggested:

6 A. M. to 6 P. M. Sets may be tuned
6 P. M. to 8:30 P. M.

..... Local unimportant work
8:30 P. M. to 10 P. M. ... Local business
10 P. M. to 6 A. M. ... Long distance work
After 10 P. M. all local work will cease and anyone desiring to work distance will first send the letters "AW". If another amateur has the air he will respond with the letters "IM", meaning "I am doing long distance work, please QRX". "AW" means "Is anyone working?"

Members and non-members are requested to give the circular wide publicity and the co-operation of every Bay District amateur is asked in order to insure better working conditions on the air.

COMMENCING Wednesday, September first, at 11:30 A. M., San Francisco time, and continuing every day except Sunday throughout the month, the DeForest radiophone station at the California Theatre will transmit press on a wavelength of 1,425 meters, using a buzzer modulated continuous wave. These signals are readable on either audion or crystal receiving sets. The press transmitted should prove of considerable interest to ship operators as it will consist almost entirely of baseball scores and sporting news, given in greater detail than is the case at present.

The co-operation of the ship operator is asked in this work and he is kindly requested to forward a report to the DeForest office at 451 Third St., San Francisco, giving data on the strength of speech, strength of buzzer, strength of beat note, static conditions, distance from San Francisco and other remarks that are of interest. The schedule will commence each day at 11:30 A. M. and will be completed by 11:55 A. M.

If you have something to sell, if you want to buy something or, if you have something that you want to exchange, use the Classified Advertising section of "Pacific Radio News." The rate is three cents per word. Advertisements for the November issue must reach us no later than October third.

PACIFIC COAST RADIO CONVENTION IS DISCUSSED AT OPEN HOUSE MEETING OF SAN FRANCISCO RADIO CLUB

At the last open house meeting of the San Francisco Radio Club, Inc., held on August 24th, it was proposed to ask the co-operation of local radio manufacturers in making the coming convention a phenomenal success. From all indications the convention will be held either in the latter part of October or the early part of November. Several Pacific Coast Radio Clubs have already expressed their desire to take an active part in the affair and various manufacturers of radio apparatus have promised their support.

Sgt. A. Lufkin, formerly a lieutenant in the Signal Corps, has been appointed Chairman of the Convention Committee. The radio raffle, held on open house night, was a marked financial success. Over \$127.00 was realized from the sale of tickets and apparatus valued at almost \$200.00 was raffled. The customary refreshments were served and lectures were delivered by U. S. Assistant Radio Inspector, Mr. D. B. McGown; Mr. S. N. Petersen of the Leo J. Meyberg Company; Mr. Colin B. Kennedy; Mr. Hall Berringer (6BJ); Mr. A. E. Pendleton; Mr. A. E. Bessey, and others.

The club rooms at 355 Presidio Avenue have been vacated, due to the recent growth in membership. All future meetings will be held in the new club room in the San Francisco Gymnastic Club, Sutter and Steiner Streets. Correspondence should be forwarded to the new address.

A COMPLETE transmitting and receiving equipment was installed by the Monterey Radio Association at the Monterey Chamber of Commerce during recent festivities. Apparatus from the European battlefields, valued at several



thousand dollars, was on display. Some of the noteworthy instruments were a three stage French amplifier, various makes of French and German vacuum tubes, a French field set and a French wavemeter. The half-tone, shown herewith, will give the reader a fair example

of the interesting display of radio apparatus staged by the Monterey amateurs. Press dispatches of the Democratic Convention were copies daily and visitors were afforded the opportunity of hearing time signals from the naval radio station at San Francisco.

RADIO LEAGUE IS ORGANIZED IN GALVESTON

Amateur radio men of Galveston, Texas, met recently and formed a radio league. The following officers have been elected to office:

Le Roy Wallin.....President
Bennett Duble.....Vice President

Louis RatisseauTreasurer
Merlin McGivneyMember
Peter BlakemanMember
A. KoehlerMember
Louis Tisell.....Member

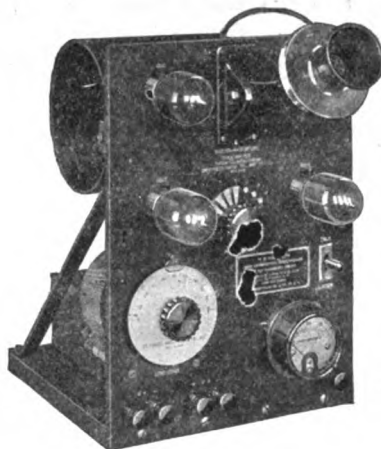
Meetings are held on Tuesday and Thursday nights of every week. Prospective members should communicate with the Vice President, 3828 Avenue P, Galveston, Texas.

Are you looking for a rheostat or variable condenser? We will give them to you free of charge if you subscribe to P. R. N. Turn to page 61 and see how to get them.



The Newest Radio Development The DeForest Portable Buzzer "Radiophone"★

TYPE OT-5



DeForest Portable "Radiophone"
Transmitter
Buzzer Type OT-5

THE LATEST development of the famous De Forest Oscillation Transmitter (Wireless Telephone). For Automobiles, Motor and Sail Boats, Camps, Surveying and Exploring Parties, Forest Patrol, Farms, and all isolated places, this new "Radiophone" set offers sure, quick, practical word-of-mouth communication. Operates on two 6-volt storage batteries; no "B" battery or other outside source of high potential is required. Can be easily transported; entire Transmitter, including batteries, weighs less than 60 pounds. Range on ordinary Amateur aerial, is 5 to 10 miles, and can be materially exceeded under proper conditions. Operates with any suitable type of Receiver and Audion Detector; with or without an Audion Amplifier, depending on the range to be covered and loudness of reception desired.

Price

Without Storage Batteries
Including Vacuum Tubes
F. O. B.—New York

\$135.00

Investigate this new DeForest production now. Order at once to insure early delivery, either through your regular dealer or direct from us.

DeForest Radio Telephone and Telegraph Co.

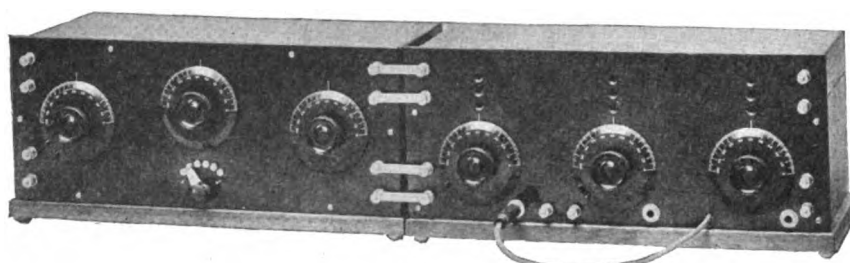
Inventors and Manufacturers of High Grade Radio Apparatus
1415 SEDGWICK AVENUE NEW YORK CITY, N. Y.

Lee DeForest, Inc.

451 Third Street, San Francisco Western Distributors
★"Radiophone." Name copyrighted



Speaking About Combinations



The RADIO SHOP Short Wave Regenerative Receiver combined with the latest addition to an already well established line.

THE "RADIO SHOP" DETECTOR AND TWO STEP AMPLIFIER

A unit possessing features not found in other sets available on the market today. Scientifically designed for amateur wave-lengths. Magnetically screened throughout for complete elimination of "feedback" howling. Transformers of correct proportions for present day tubes. Non-heating rheostats. Tube sockets which take either standard V-Ts or Navy type valves. Hinged cabinet top for easy access to interior for removal of valves. Mica fixed condenser in detector circuit of correct capacity for regenerative circuits. Separate plate battery control for detector and amplifier valves. Extreme simplicity of connections. Connection strips furnished for connection to short wave receiver. Furnished without valves or batteries.

PRICE.....\$75.00

THE "RADIO SHOP" SHORT WAVE REGENERATIVE RECEIVER

Now licensed under Armstrong U. S. patent No. 1,113,149. Described in detail in previous issues of "Pacific Radio News."

NEW PRICE.....\$45.00

Both sets sold with the distinct understanding that your money will be immediately refunded if you are not satisfied. We will shortly have interesting literature on the above and other "RADIO SHOP" products. A stamp will put your name on our mailing list.

THE RADIO SHOP

BANK OF ITALY BUILDING

Dept 5.

SAN JOSE, CALIFORNIA

YOU men who live in the West are as near to the G-A House as your nearest mail box. Mail your orders.

G. A. Standardized Supplies

If you could see the enormous quantity of wire, and the thousands of bakelite panels in the stock room of the G-A Company, you would feel insured against delays in the shipment of your orders.

G. A. STANDARDIZES OF HIGH FREQUENCY CABLE

All receiving inductances for wave lengths up to 3,000 meters and vacuum tube transmitters should be wound with high frequency cable if maximum signal intensity and sharpest tuning is required.

10—No. 38 20—No. 38 3x16 No. 38
50 turns per inch **\$1.60** 38 turns per inch **\$1.95** 20 turns per inch **\$2**

Prices are per 100 feet. The finest enamel covered wire is used. Covered with two wrappings of unbleached Italian silk threads.

G. A. STANDARDIZED BAKELITE PANELS

Sizes for everything from detector bases to complete sets. Every panel smoothly and squarely cut to an accuracy of 1/32 inch.

Thick	2½x5 Ins.	5x5 Ins.	5x10 Ins.	10x10 Ins.	10x15 Ins.
⅛ in.	\$0.30	\$0.60	\$1.18	\$2.35	\$3.50
2 oz.	4 oz.	4 oz.	8 oz.	1 lb.	2 lbs.
3/16	\$0.44	\$0.88	\$1.76	\$3.50	\$5.25
3 oz.	6 oz.	6 oz.	12 oz.	1½ lbs.	3 lbs.
¼ in.	\$0.58	\$1.16	\$2.30	\$4.60	\$6.85
4 oz.	8 oz.	1 lb.	2 lbs.	4 lbs.	



THE GENERAL APPARATUS CO., Inc.

570-P West 184th St., at St. Nicholas Avenue

NEW YORK CITY.

AUDIOTRON ADAPTOR



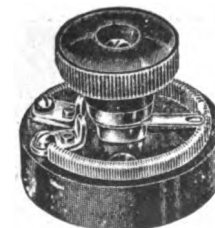
Consists of standard 4 prong base with brass supporting connectors. Permits mounting tube in vertical position so filament will not sag and touch grid.

\$1.75 POSTPAID
NEW "VT" SOCKET
Mica-Copper-Foil Grid Condenser, 40c.
We strongly recommend our 44 Volt Variable "B" Battery for use with Detector "VT's," \$3.60.

Moorhead Electron Relays, \$6.00. (With standard base. See Moorhead adv.)
\$10 General Radio Ammeters, \$5. (0-2½ amps. for antenna radiation or filament current indication.)

PARAGON RHEOSTAT

The 6 ohm resistance permits fine filament control with 4 or 6 volts. 2½-in. dia. See March R. A. N., page 467, for details. Shaft reversible for back mounting.



\$1.75 POSTPAID
Western Electric P-11 Army-Navy Phones\$12
Special Acme Amplifying Transformers to use with above phones, \$4.50 unmounted. With stands, \$5.

Ground Wire, 8c per ft., \$7 per 100 ft.
Good 100 Amp. 600 V. Lightning Switches —\$4.00—

RADIO EQUIPMENT CO.

630 Washington St. Boston-11, Mass.

When writing to Advertisers please mention this Magazine

THE LOG OF THE S. S. "DURANGO"

Wherein the Operator of the Vessel, E. M. Sargent, Records the Reception of Radiophone Music From the California Theatre at a Distance of 725 Miles North of San Francisco

July 27th, 2:30 P. M.—Undamped telegraph signals audible four inches from phones. Good typewriter signals. Speech audible but weak. Not able to understand it. Wavelength about 1540 meters. Weather overcast, foggy. Light static. Temperature 55. Ship's position 150 miles south of San Francisco. 9:30 P. M.—No signals sent out. At 9:20 beat note was loud, about same as in afternoon. Unable to hear the music. Ship's position 77 miles south of San Francisco.

July 28th, 2:30 P. M.—No signals sent out. 4:30 P. M.—Beat note very loud. Speech barely audible. High notes in orchestra and singing coming through very faintly. Other notes unheard. Weather clear. No static. Temperature 60. Ship's position 72 miles north of San Francisco. 9:30 P. M. No signals heard.

July 29th, 2:30 P. M.—Beat note good. Weaker than yesterday but fair typewriter signals. Wavelength about 1520 meters. Weather clear and warm. Light

static. Ship's position 290 miles north of San Francisco. 9:30 P. M.—No signals received.

July 30th, 2:30 P. M.—No signals received. 9:30 P. M.—No signals received.

July 31st, 2:30 P. M.—Missed schedule. Ashore in Seattle. 9:30 P. M.—Beat note fair. Too weak for typewriter but easily readable. Wavelength about 1540 meters. Heavy static, drowning signals at times. Weather clear and warm. Ship's position—in Seattle harbor at Gen. Petroleum dock.

August 2nd, 2:30 P. M.—Beat note good. Typewriter signals. Speech good, loud and clear. Would be excellent with one step amplifier. Buzzer signals louder than beat note. Fine typewriter signals. Beat note has slightly rough characteristic, but not enough to affect its working. Sounds like alternating current in the filaments. Wavelength 1720 and 1780 meters. Both good. Ship's position—in eastern part of Juan de Fuca straits, 725 miles north of San Francisco.

9:15 P. M.—Beat note weak. Unreadable through static. Much weaker than

in afternoon. Can't hear music.

9:30 P. M.—Beat note growing weaker.

9:47 P. M.—Beat note has faded completely out. Am also unable to hear beat note from Los Angeles wireless phones. Usually very loud. Note:—At 9:30 ship passed into mouth of Juan de Fuca straits. In this position there is a range of heavily wooded hills, averaging 2200 feet high, five miles directly to south of us. This probably accounts for fading of signals.

August 3rd, 2:30 P. M.—No signals heard. 9:30 P. M.—Beat note fair when running steady, fading as soon as sending commenced. Static very heavy. Unable read sending. Wave about 1670 meters. Weather clear. Ship's position 460 miles north of San Francisco.

August 4th, 2:30 P. M.—No signals received. 4:30 P. M.—No signals received. 9:30 P. M.—Beat note very loud. Good typewriter signals. 9:42 P. M.—Beat note getting louder. Weather overcast, foggy. Heavy static. Wavelength about 1660 meters. Ship's position 120 miles north of San Francisco. No music heard tonight.

PEN BRAND GRID CONDENSERS



When buying a grid condenser buy the best, even if you have to pay a little more. It is the one piece of apparatus on a receiving set that must be right to get best results and once installed will last for years. A mica condenser properly made is the best. A poor condenser in the grid circuit is as bad as none at all.

We can safely recommend PEN BRAND GRID CONDENSERS to the discriminating amateur who prefers the best. Made of the best grade bakelite, copper foil, separated by the best grade India Mica.

Three sizes—.0002, .0004 and .0005 mfd. capacities. Each size sells for one dollar, postpaid to any part of the United States.

Dealers Inquiries Invited

THE RADIO TELEPHONE SHOP
175 Steuart St., San Francisco, Cal.

Radio Club Directory

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Steiner Sts., San Francisco, Calif. Meetings every Tuesday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

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ALL THAT ITS NAME IMPLIES
THE MAGAZINE OF EXPERIMENTAL AND PRACTICALLY
APPLIED SCIENCE

Monthly articles on the design, construction and operation of radio telephony and telegraphy apparatus, chemistry, construction of apparatus, analysis, etc.; physics, popular science, physical phenomena, etc., etc. Literature sent on request. 15c a copy at most newsstands. \$1.50 yearly.
EXPERIMENTAL SCIENCE PUB. CO., 710 14th Street, Washington, D. C.

Wesrad Mail Order Service

A real live, up-to-the-minute and always-on-the-job mail order radio supply house, west of the Rockies, is a real necessity and will fill a long-felt want. Hence—our new mail order department—and now you won't have to shut down while Uncle Sam's Post Office Department saunters across the continent with your order.

The Pacific Radio News will be our official mouthpiece—Look for our ad each month and we will look out for you. Let's go!

IMMEDIATE DELIVERIES ON THE FOLLOWING ITEMS, DELIVERED POSTPAID WEST OF THE ROCKIES:

RHEOSTATS

Paragon	\$1.75
Remler, back mounting	1.75
Remler, Junior, back mounting	1.00
Parkin, front mounting	1.00

SOCKETS

DeForest	\$1.60
Remler, back or table mounting ...	1.50

SWITCHES

DeForest, Anti-Capacity	\$3.00
Remler, Large bearing.....	1.00
Remler, Small bearing60

WAVEMETERS

Amrad	\$8.50
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MODULATION TRANSFORMERS

Acme, A-3 semi-mounted	\$5.10
------------------------------	--------

AMPLIFYING TRANSFORMERS

Acme, Semi-mounted	\$5.10
Acme, Unmounted	4.60
Federal	7.60
Federal, without base and terminals	6.10

DETECTORS

DeForest, D-101 Dust proof.....	\$3.00
Grebe, Dust proof.....	2.80
Murdock, No. 324 .....	.75
Adams Morgan	1.75

MAGNET WIRE

No. 18 Single Cotton, per lb.	\$1.20
No. 20 Single Cotton, per lb.	1.45
No. 22 Single Cotton, per lb.	1.90
No. 24 Single Cotton, per lb.	2.30
No. 28 Single Cotton, per lb.	3.00
No. 30 Single Cotton, per lb.	4.70
No. 34 Single Cotton, per lb.	4.80

Also a complete line of Grebe and Amrad products, delivered to us by freight and sold to you on our list plus actual transportation basis. If what you want is not listed—send in your order anyway—We no doubt can fill it—or we will get it for you pronto.

Western Radio Electric Company

550 SOUTH FLOWER ST.

LOS ANGELES, CALIF.

"TUNING IN" ON THE WIRELESS

"Tuning in" on some of the wireless telephone communications floating about southern California's sunny atmosphere is becoming quite a sport. All of which, it might be added, is illustrative of the fact that wireless telephone communication is far from a private means of intercourse.

Recently this new and modern system has been installed at Catalina Island. Switch board operators at San Pedro and on the island are able to connect up parties with the main land telephone system and points on the resort island via wireless. In fact it is now possible to communicate from Redlands via long distance and wireless to a friend, sweetheart, mother-in-law or otherwise, who perchance may be stopping at the St. Catherines Hotel. It is beyond the experimental stage and is proving quite popular and commercially satisfactory.

However, don't get the idea that one can't listen in on a wireless message. That's where the "tuning in" comes in. It's a part of the mechanical equipment which permits anyone familiar with the game to pick up messages passing through the air within range of his receiving apparatus. It also is possible for a third party to "butt into" the conversation.

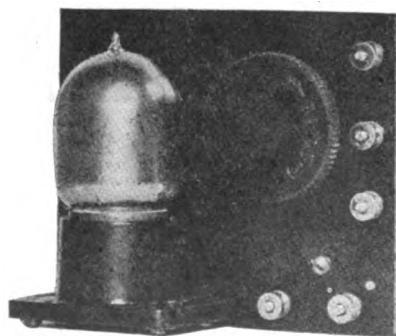
As an illustration. Yesterday afternoon, a young lady, at least her voice was that of a young lady, called the room clerk at the St. Catherines Hotel from Los Angeles. She requested that a room with twin beds be reserved for her over the week end. And just then, some big gruff voiced gob, presumably on one of Uncle Sam's destroyers, somewhere in the Pacific, broke in and inquired what caused the argument. The room clerk is trying yet to square himself with the prospective customer.

Then another example. Late last evening another conversation was overheard. A young lady in Pasadena was conversing with her fiance at Catalina. "Did you get my last letter?" she asked. "Yes," he replied. "Well, John, don't pay any attention to what I said in that letter because I didn't mean a word of it and I'm sorry," she said. And John said that was all right as he was used to getting such letters—and bang again, went the second receiver and all communication was lost.

Shortly afterward a staff member of a Los Angeles afternoon newspaper was heard to relay via wireless baseball scores from the eastern leagues. And immediately following he dispatched a few late stock market quotations. Yes—after all—it's a fascinating game. But take warning. There are any number of amateur wireless telephone operators

(Continued on page 60)

ONE STAGE AMPLIFIER PANEL



\$13.75 WITHOUT TUBES
SHIPPED POSTPAID
TO ANY ADDRESS

An ideal instrument for long distance receiving during the winter months. Complete with amplifying transformer, highly polished genuine, Bakelite Panel, smooth running filament rheostat, latest model, V.T. socket, brackets for table mounting and nickel plated binding posts. Completely wired—ready for use.

WRITE FOR PRICES ON OTHER
STYLES

Immediate Deliveries

Radio Development Company

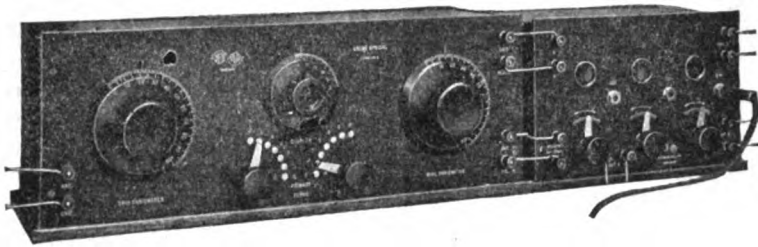
P. O. BOX 2114

SAN FRANCISCO, CALIF.

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A Combination that Can't be Beaten

For Results—real long-distance signals on short wave lengths you can't beat the



Relay Receiver (Type CR-3)
and

Detector and 2-Stage Amplifier
(Type RORD)

This is the Outfit which made a reputation for itself in the recent QSS tests.

You can get into the Big Relay Game and become one of the dependable long-distance men with this outfit.

Inspect this Outfit at your Dealer's. If he doesn't carry our line as yet, drop us a postal for catalogue, mentioning his name.

GREBE RADIO apparatus is licensed under the original Armstrong and Marconi patents.

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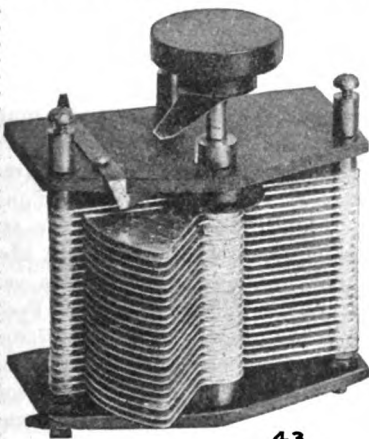
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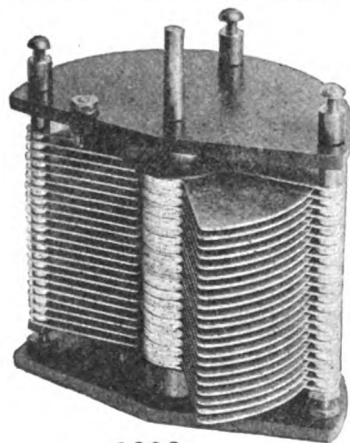
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A. H. GREBE & CO., Inc., 73 Van Wyck Blvd., Richmond Hill, N. Y



43



4300

Announcing a New Variable Condenser

Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

REMEMBER—WE ABSOLUTELY GUARANTEE SATISFACTION OR YOUR MONEY BACK.

SERIES "T"				—PRICES—		SERIES "L"			
No. 20	2	plate	VERNIER	.....	\$2.00	No. 2300	23 plate, .00075	.....	\$ 6.00
No. 70	7	"	.0001 m.f.	.....	2.35	No. 4300	43 plate, .0013	.....	8.00
No. 130	13	"	.0002 m.f.	.....	2.75	No. 6300	63 plate, .002	.....	10.00
No. 170	17	"	.0003 m.f.	.....	3.15				
No. 230	23	"	.0005 m.f.	.....	3.60				
No. 310	31	"	.0007 m.f.	.....	4.30				
No. 430	43	"	.001 m.f.	.....	5.25				
No. 630	63	"	.0015 m.f.	.....	7.50				
Include postage for one pound						Include postage for two pounds			
Either style of condenser fitted with indicating dial at additional cost of 75c.									

Either style of condenser fitted with indicating dial at additional cost of 75c.

The Wireless Shop

511 W. WASHINGTON STREET

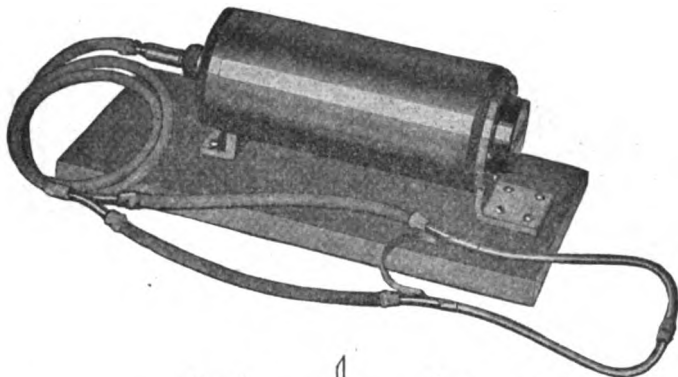
A. J. Edgcomb

LOS ANGELES, CAL.

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NOSTAT

"Conqueror of Static"



For working through
(QRN) or (QRM)

For sale by Dealers
or direct



The one piece of Radio
equipment you can not
afford to be without

NOSTAT COMPANY
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SAVE RADIO \$\$ BY CONSULTING

THE RADIO BUYER'S AND BUILDER'S HANDBOOK

Describes and Simplifies
New Radio Inventions and Improvements

NOW **OUT**
NEW HOOKUPS to MAKE all the APPARATUS you use MORE EFFICIENT
This book contains nearly 200 pages, many diagrams, and over 30 full page half-
tones of simple efficient apparatus. Inc. 16 scale cutouts—in black and white

PRICE—\$1.00 Per Copy

See Radio dept. June and July Popular Science, Radio Amateur News and Pacific
Radio News for my first new stories.

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A 90c Experimental Vacuum
Valve Detector, sensitive,
made in a few minutes
obtainable at any time.

Radio "Tricks of the Trade"
—solid silver switch points
for 3 to 5 cents.
Variable Duplex Oil Con-

densers for sending and
receiving.

How to Buy Second Hand
Radio and Electrical Ap-
paratus Cheap.

A Rectifying Gap Motor
which supplies "B" Bat-
tery or "A" current.
Many New and Good Ideas
on "A" and "B" Batteries
of Little Cost.

Commercial Type Rotary
Quenched Gaps of Low
Cost.

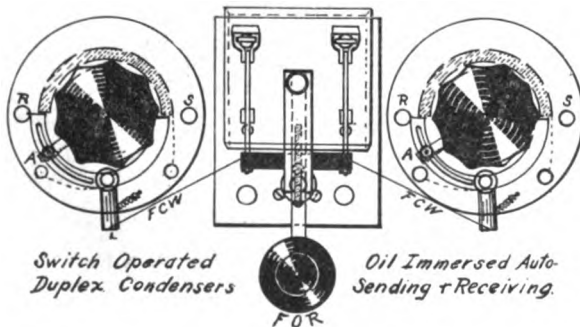
Modern Second-hand Elec-
tric Motor-Generators up
to 1/2 H.P. for \$6.00.

Also many methods of sav-
ing time and money on

BETTER APPARATUS.

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11 Barnes, Rd., Newton,
Mass., or your dealer, your
Radio Club, your public li-
brary.



Switch Operated
Duplex Condensers

Oil Immersed Auto-
Sending + Receiving

PACIFIC RADIO SCHOOL

ARC AND SPARK SYSTEMS

THE MOST UP-TO-DATE AND EXCLUSIVE RADIO SCHOOL IN THE
WEST. LATEST TYPE POUlsen 2 KW ARC TRANSMITTER AND
INDEPENDENT TYPE ONE KW 500 CYCLE SPARK SET.

EQUIPMENT IN ACTUAL OPERATION.
NAVY STANDARD RECEIVING SET WITH AUDION AMPLIFIER.
UNDER THE PERSONAL SUPERVISION OF ADDISON S. MCKENZIE,
CHIEF ELECTRICIAN, U. S. N. R. F., FORMERLY INSTRUCTOR AT
MARE ISLAND NAVY YARD AND W. A. VETTER, FORMERLY CON-
STRUCTION FOREMAN FOR THE MARCONI WIRELESS TEL. CO.

INSPECTION INVITED. SEND FOR DESCRIPTIVE CIRCULAR.
433 NEW CALL BUILDING SAN FRANCISCO

(Continued from page 58)

in the community who can steal your message. It's done by "tuning in," a mechanical process which is highly en-
tertaining.

PLANES FLY OVER PROJECT Wireless Telephone and Telegraph for Benefit of Guests

Colonel H. H. Arnold, in charge of the Department of Air Service, an-
nounced that the airplanes of the local Forest Patrol Station would fly to Au-
berry and maneuver over the Kerckhoff power project at the dedication cere-
monies at Kerckhoff Power House.

Public to Use Wireless Phones

He has instructed Lieutenant Mor-
gan, in charge of the local patrol ser-
vice, to carry out these arrangements
and he has also detailed Lieutenant H.
E. Metcalf, radio officer in charge of all
radio work in the forest patrol service
from Bakersfield to Medford, Ore., with
headquarters at Mather Field, Sacra-
mento, to install two sets of radio tele-
phones so that the visitors to the Kerck-
hoff Project may hold conversations
over this newest of wireless inventions.
One set will be placed at the top of the
hoist leading to Kerckhoff Dam and the
other set will be at Camp No. 4, just
above the Kerckhoff Power House, a
distance of three and one-half miles.
These new type air service radio phones
permit a two-way conversation at one
time and are the very latest in radio
communication.

Lieutenant Metcalf Wins Much Renown

Lieutenant Metcalf has won much
renown in the army service as a ra-
dio officer and has been given a great
deal of credit for the high state of per-
fection to which this branch of the ser-
vice has been worked. Lieutenant Met-
calf achieved national prominence a year
ago last April when he delivered Presi-
dent Wilson's speech for the Victory
Loan Drive, which was cabled from
France while the President was at work
there on the peace treaty. Lieutenant
Metcalf delivered this speech by radio
telephone from an airplane to thousands
of people who were gathered around the
Treasury Building in Washington. He
has been in the radio service for more
than two and a half years and previous
to entering the army was a radio engi-
neer and also assistant professor at the
North Dakota Agricultural college. He
will be assisted with the radio phones
by Sergeant Lang of the local radio
station. Sergeant Lang will be in charge
of one of the sets and Lieutenant Met-
calf of the other.

The guests will be given the oppor-
tunity of talking over the wireless tele-
phone.

When writing to Advertisers please mention this Magazine

ARC RADIO APPARATUS

(Continued from page 45)

and consequent decrease in resistance. The presence of the magnetic field prevents this arrangement of particles in the path of least resistance by exerting a powerful torque upon these minute magnetic bodies. Because of the motor action resulting from the effect of the transverse field upon the field of the arc itself, the arc is blown out to the side and its path is materially lengthened further increasing the resistance. Another function performed by the magnetic field is the generation of a high potential in the supply circuit following the extinction of the arc and the collapse of the field. This increases the condenser charging potential at the end of the charge which aids the inductance in the oscillating circuit in overcharging the condenser. Since the magnetic field has no effect upon the arc path during the time that the arc is extinguished, the resistance falls very rapidly and the potential difference across the electrodes due to condenser charge, breaks down the gap. The condenser then begins its discharge.

Briefly, the action of the arc throughout a complete cycle is as follows: The condenser circuit begins to charge, robbing the arc of a portion of its current. This increases the arc potential, and owing to the slope, $-dv-di$, of the current-voltage curve, the charging of the condenser is greatly accelerated. As the condenser electro-motive force resulting from the charge increases, the current falls, but when the condenser is fully charged, the current still continues to flow into it because it cannot stop instantly owing to the inductance in the circuit. This overcharges the condenser, and results in a potential sufficiently great to break down the gap between the electrodes, when the discharge begins. The successful operation of the arc as a source of oscillating currents is very much dependent upon the overcharging of the condenser and this is borne out by the fact that arcs operate best with oscillating circuits having a fairly high value of inductance.

(To be continued)

Six new stations will be erected in various cities of the United States for communication with the planes of the aerial mail service. It has been learned that the new type 2 K.W. Federal Arc transmitter will be employed.

Send us eight dollars and we will send you six or seven dollars' worth of radio apparatus and a four-year subscription to "Pacific Radio News," valued at eight dollars.

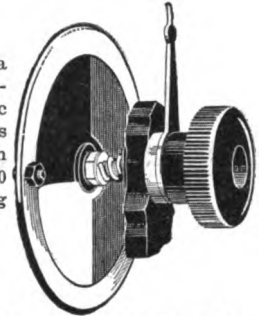
An Extraordinary Offer

Radio Apparatus Given FREE to Readers of PACIFIC RADIO NEWS

Combination No. 1**RHEOSTAT FOR PANEL MOUNTING**

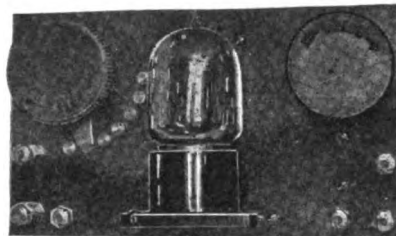
Given Free with a one year subscription to "Pacific Radio News." Add 10 cents for mailing charges.

This Rheostat Regularly Sells for \$1.00

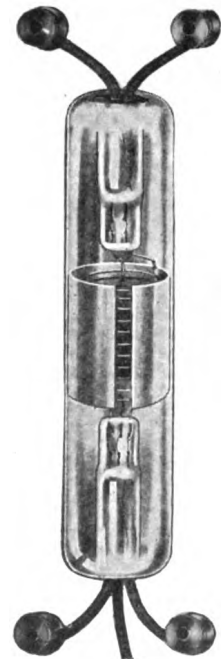
Combination No. 2
VARIABLE CONDENSER FOR PANEL MOUNTING

Given Free with a two year subscription to "Pacific Radio News." This is the new Parkin invention. Add 10 cents for mailing charges.

This Condenser Regularly Sells For \$2.00

Combination No. 3
BAKELITE AUDION CONTROL PANEL

GIVEN FREE with a 5-year subscription to "PACIFIC RADIO NEWS"
Add 25c for mailing charges
This panel regularly sells for \$3.00
No Tubes Furnished

Combination No. 4
AUDIOTRON TUBE

Given free with a four-year subscription to "Pacific Radio News." All tubes are genuine and fully guaranteed by the manufacturer. Add 25 cents for mailing charges.

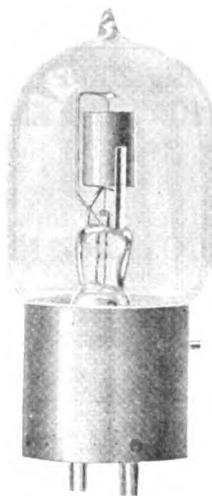
This Audiotron Regularly sells for \$6.00.

Combination No. 5**The A. P. V. T. TUBE**

Given Free with a four year subscription to "Pacific Radio News." Specify whether an Amplifier-Oscillator or Detector Tube is desired. Add 25 cents for mailing charges.

These Tubes Regularly Sell For \$6.00 and \$7.00

All Tubes are Genuine and Guaranteed.



These Instruments will be Awarded on Extensions, Renewals or New Subscriptions.
Subscription Rate \$2.00 per year.

----- **COUPON** -----
PACIFIC RADIO PUB. CO. 50 Main St., San Francisco, Calif.

Herewith is \$..... and..... cents for Mailing Charges.

Please send "Pacific Radio News" for..... years to:

Name....., Street & No.....

City..... State

You will also promptly mail me the apparatus described in Offer No.....

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

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Official Organ

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44 Broad Street, New York

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Shipped to you FREE. Not a cent to pay until you see the books. No obligation to buy unless you are satisfied. Send coupon now—today—and get this great help library and see if it is not worth \$100 to you—you pay \$1.00 a month for 10 months or return it.

SEND NO MONEY

THEO. AUDEL & CO., 72 Fifth Ave., N. Y. Please submit for examination Hawkins Electrical Guides (Price \$1 each). Ship at once, prepaid, the 10 numbers, if satisfactory, I agree to send you \$1 within seven days and to further mail you \$1 each month until paid.

Signature _____

Occupation _____

Employed by _____

Residence _____

Reference _____ P.R.N.



DUCK'S New Big 200-Page No. 14 Wireless Catalog and 100-Page Electrical Catalog

The wireless catalog mailed for 12c and the electrical catalog for 6c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. Everything in wireless worth while is listed in this catalog. The experienced amateur will tell you to see our catalog before buying. You are thereby insured against an unwise purchase. It is the Beacon Light to guide you right in the selection of your wireless apparatus. No bigger or better values are obtainable elsewhere.

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

ANYTHING IN—

RADIO APPARATUS

Electric Supply and Repair Co.

Frank P. Herrguth Al Rosenberg

Formerly of Paul Seiler Electric Works

520 Market Street

San Francisco, Cal.

When writing to Advertisers please mention this Magazine

"Y" RADIO CLUB CELEBRATES ITS FIRST ANNIVERSARY

The first anniversary of the "Y" Radio Club of Santa Barbara was celebrated September 7th with the election of officers for the coming six months, at the club rooms in the Y. M. C. A.

One year ago, the club was organized with a membership of six. The only equipment consisted of a buzzer practice set with which they had code practice every Tuesday evening. During the past year the club has increased in membership to twenty, and by Y. M. C. A. and a few private contributions it now has a complete transmitting and receiving set, second to none in the city.

Not only has this set been installed at the club, but due to the untiring efforts of J. C. Lewis, vice-president and instructor of the club, and R. H. Schauer, retiring president, who is assisting most of the members who now have receiving sets in their homes, while some, a little further advanced, have transmitters.

The officers elected last night for the coming six months are, Geoffry Lawford, president; J. C. Lewis, vice-president; R. H. Schauer, secretary, and Maurice Jones, treasurer.

Max Meyers, formerly First Class Radio electrician, U. S. N., gave a short talk on the proper way to transmit a message, after which light refreshments were served.

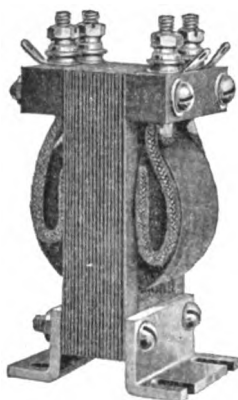
The club is planning to send delegates to the Pacific Coast Amateur Radio convention which is to be held in San Francisco during the early part of November.

Beginning Saturday, September 11th, time signal will be sent every evening at seven o'clock from the club station, followed by weather report and press messages. All communications to the club should be addressed to R. H. Schauer, secretary, 1009 E. Haley street, Santa Barbara, Calif.

IN order to be of mutual assistance to one another in promoting the science of radio communication, a number of Riverside amateurs have organized a radio club. They will meet at the home of the president, Mr. Howard C. Gates, No. 1 Cloyne court on the 1st, 10th, and 20th days of each month. "Riverside Wireless Club" is the name of the new organization.

Turn to page 61 before you lay this issue aside. The extraordinary offer is of such importance to every radio amateur that he should not fail to take advantage of one or more of the advertised combinations.

To obtain the very best results use Federal Standard Accessories



No. 226-W—Type A
Audio Frequency
Transformer

THEY ARE USED by the leading Experimenters, Manufacturers and by the Government.

The standard 226-W Audio Frequency TRANSFORMER is more popular and efficient than any other because it **GIVES RESULTS. YOU SHOULD USE IT.**

Our new Bulletin 102 W-B is now ready for mailing. Send 4c in stamps.

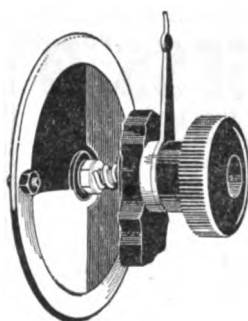
CONTAINS NEW INFORMATION

Our line of Jacks and Federal Duo-Lateral Inductances just out.

If your dealer does not have them,
write the

Federal Telephone and Telegraph Company

1766 Elmwood Ave., Buffalo, N. Y.



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16 ..

Dealers: Write for discounts

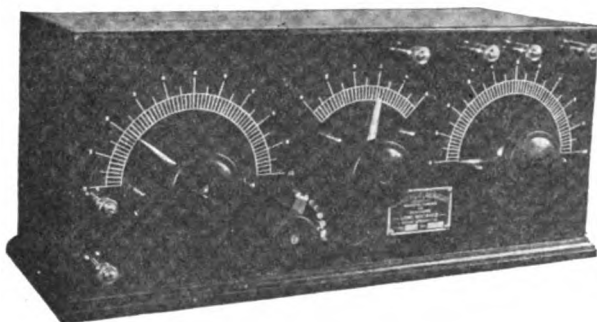
PARKIN MFG. CO.,

San Rafael, Calif.

★ **ASHEVILLE N.C.** 10c stamp for Catalog and ★
Radisco Agency for this District deduct from first order
! **SPECIAL**—Complete VT & Tron receiving set on Formica panel 6½ x 10x3-16, with 43 plate variable and universal coil, \$19.50. !
★ **Manufacturers and Distributors** ★
HI-GRADE WIRELESS INSTRUMENT CO.

When writing to Advertisers please mention this Magazine

Radiophone Music from Alaska With the C. R. L. Paragon!



C. R. L. Paragon Short-Wave Regenerative Receiver

During the week of July 26th, L. J. Simms of station KBC, Billings, Montana, copied radio telephone conversation from Alaska, using our famous C. R. L. Paragon and Amplifon combination. And this in summer!

Think of what the C. R. L. Paragon can do for your relay work this winter!

The C. R. L. Paragon can now be used to receive long wave time signals. Watch for our announcement of the Paragon Time Adapter next month.

C. R. L. Paragon Short Wave Regenerative Receiver, F.O.B. Chicago, \$55.00.

Licensed under original Armstrong U. S. Patent No. 1,113,149 and U. S. Application Serial No. 807,388.

CHICAGO RADIO LABORATORY

1316 CARMEN AVENUE

5525 Sheridan Road (Testing Station 9ZN) CHICAGO, ILL., U. S. A.



Pat. App. for

Radisco Agency
We make special instruments
to order

Attention Amateurs!

*This is the adapter which tubular
bulb owners have been looking for*

Price \$1.50



Catalogue sent on receipt of 10c, which may be deducted
from first order

Dealers write for propositions.

Amateur Wireless Equipment Co.
1390A Prospect Ave., Bronx, N. Y.

-MARCONI INSTITUTE-

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

335 New Call Bld., San Francisco

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

The Radio Telephone Shop begs to announce that it has purchased a large portion of the stock of a bankrupt concern, and has decided to give the amateurs the benefit of this purchase as a means of advertising our company. This one advertisement will be the only one inserted in any magazine. And furthermore, this sale of goods will be at an end on the twentieth of October. This will give everybody a chance to get in on it. After the above mentioned date all the items listed here will go back into the new article class. This is a good chance for those making up their own sets to get in and get their knobs, etc., at a good price. No C.O.D. orders will be accepted. Money order or cash must accompany each order. The following list is all new stock.

1 1/2 in. commercial type knobs 8-32 bushing 25c; our price 15c.

1 1/4 in. rounded face, hole through center knob 25c; our price 15c.

5/8 knob, commonly used on detectors, 10c; our price 5c.

1/2 knob, commonly used on binding posts, 10c; our price 5c.

1 1/4 telegraph key knob, good for speed keys, 15c; our price 8c.

We have several other knobs, write us what you want we have it.

We have a limited number of detectors, ranging in prices from \$1.50 to \$3.00. We will sell these for \$1.25 each. First come gets most expensive. In A-1 condition. Tuning coil sliders Nickerled 20c each. Detector cups ready to mount 25c. Nickel plated pointers and switch levers 10c each. Aerial switch supports moulded bakelite 50c. Loose coupler and tuning coil ends, moulded bakelite, takes 3/4 inch tube 75c each. Loose coupler runner supports, nickel finish, 20c each. Small Junior spark gaps \$2.00 regular price, our price \$1.25 each. Fixed receiving condensers \$1.00 regular price, our price 50c. Black indicating dials with brass letters for condensers, couplers and switch point scales, commercial type regular 50c our price 25c. Name plates for antenna, ground, audion and every description; black enamel finish with brass lettering 10c each or \$1.00 a dozen. Loose coupler primary ends, take 3/4 inch tube, 10c each. Ground clamps 30c each. We have numerous other articles that are required in every amateur station, including hot wire meters, voltmeters, ammeters, switchboard switches, etc. Also three Clapp Eastham 1 K. W. sending condensers, second hand but in perfect condition, \$20.00 each. Besides the above we stock a line of parts and equipment too numerous to mention. Write for prices on any apparatus that you require. No orders accepted for less than one dollar.

THE RADIO TELEPHONE SHOP

175 STEUART ST. San Francisco, Cal.

RADIO PHONISTS ATTENTION. HIGH VOLTAGE GENERATORS. We supply these motor generator sets in various capacities, especially designed for radio phone work, also low powered rotary converters, dynamotors, fractional H. P. motors and storage batteries. We are in a position to solve your generator problems and supply machines to fill your requirements. We also have the standard RAY-DI-CO phone sets complete, or furnish any part thereof. In fact, if it is radio equipment of any kind, or a set of your own design, write us stating your requirements and become acquainted with our SERVICE. RAY-DI-CO (Not Inc.) 2653 C. N. Clark St., Chicago, Ill.

GENUINE AUDIOTRONS, Double Filament, double life. Used as detector, oscillator and amplifier. Stock of Audiotron Mfg. Co. nearly exhausted.

Order for one.....\$5.50 each
Order for two.....5.25 each
Order for three.....5.00 each
Order for four.....4.75 each

Satisfaction guaranteed. The Kehler Radio Laboratories, 901 West First Street, Abilene, Kansas.

When writing to Advertisers please mention this Magazine

Classified Advertisements

A WONDERFUL BARGAIN! Three thousand meter receiving set in mahogany cabinet with hard rubber front containing loose coupler, loading coil, variable condenser, fixed condenser and crystal detector. Has hard rubber switch handles and loose coupler as well as loading coil are tapped. No sliding contacts. In good condition and neat workmanship. Will sell for \$20.00

Also sell one variable condenser, 27-plate mounted in oak cabinet with scale and rubber knob and short circuiting switch. Sell for \$6.00. Two battery motors, sell both for \$4.00. One hard rubber tube, 1/4-inch thick, 7-inch diameter and 14 inches long \$5.00. One marble switch board 14x24 inches with large aerial switch, 3 D.P.S.T. switches and 1 S.P.S.T. switch \$6.00. One telegraph key, nickel plated \$1.00. 1 United Wireless transmitting key with large contacts, mounted on marble base \$3.00. Wm. M. Griffith, 205 Downey Street, San Francisco. Telephone Park 3953.

THREE STEP AMPLIFIER. Can be used either as a detector and two-stage amplifier or straight three stage amplifier. This amplifier is of the French three "TER" model. In perfect condition. Price, less tubes, \$98.00. H. E. Matt, 1701 Franklin St., San Francisco.

TRANSFORMER FOR SALE. 1-4 K. W. in good condition. A snap. C. Henn. 1620 48th avenue, San Francisco, Calif.

AMATEURS! Do you want to earn some extra money in your spare time? Write for our subscription proposition and other interesting information. Pacific Radio Pub. Co., 50 Main St., San Francisco, Calif.

Oh!
By
Gosh!

**A
ACE
E**

You want our new ACE Unicoil set. Any wave range from 150 to 20,000 meters; uses unmounted Honeycomb or Duo-Lateral coils, brings the sigs; and the price without coil is only \$40.00.

Order coils for wave length wanted, we have them. 10,000 to 20,000 meter coil \$3.35. 1,000 to 3,500 meters, \$2.25. 400-1200 meter coil \$1.45. Amateur wave length coil \$1.30. We have the best C-W sets going.

REMEMBER, "You may pay more, but you can't buy better."

THE PRECISION EQUIPMENT CO.
2437 GILBERT AVE., Dept. F
CINCINNATI, OHIO

RADIOPHONE & "CW" ACCESSORIES

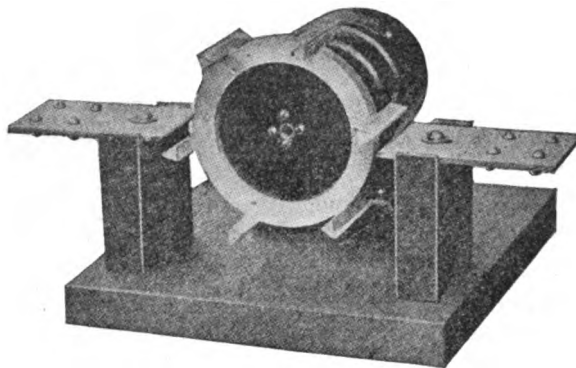
Our Rectifier-Transformer outfit supplies 350 V.D.C. to power VT's, and Low Voltage A.C. for heating filaments of Rectifier and power VT's.

Unmounted 50-Watt Rectifier Transformer\$12.00
2 Electrodyne Rectifier VT's..... 14.00
2 Non-Melting Bakelite V.T. Sockets 2.50
Immediate delivery, include 10-lb. postage
Type J. 0-300 Milliammeter, 3-inch dia. Flush Type\$6.00
New Honeycomb Coil Adapter..... .75
Has adjustable arms, permitting many new uses.

10,000 Ohm Transmitting Grid Leak 2.25
Send 4c for bulletins describing a new Variable Condenser, and all parts and building supplies for "VT" Transmitters, etc.

SOMERVILLE RADIO LABORATORY
102 Heath Street Somerville, 45, Mass.

GIVE YOUR SPARK A CHANCE



Our New Rotary allows all of the energy in the closed circuit a free discharge surface. Electrodes are 2 1/2 inches wide and 1-16th inch thick, accurately shaped on a milling machine. Made with 6 or 12 points for high or low note. You can't beat the combination of an Acme transformer and our 12 point rotary. Absolutely highest efficient gap ever offered, fully guaranteed.

PRICED AT \$50.00 WITH EITHER ROTOR
Literature ready for distribution June
first and IMMEDIATE DELIVERIES

Wireless Manufacturing Co. Canton, Ohio



HOOK 'ER TO YER BULB

THE MOST WONDERFUL TUNER IN THE WORLD FOR \$15

It weighs but two pounds—size about 4 1/2 x 4 1/2 x 3 inches. It has a primary and secondary coil only and receives all arc signals from 5,000 M to 20,000 M. It will not work with a crystal detector. The wiring diagram is on the bottom of each tuner. Do not remove top of tuner or you will destroy it—the coils are waxed in and leads are short. Tests all over the world show this tuner will receive efficiently arc signals on the smallest aerial. We recommend a single wire 25 feet high by 40 feet long. Three variable condensers and an audion are needed for the circuit.

Don't take our word for it—write us for name of nearest Amateur using one; add Parcel Post.

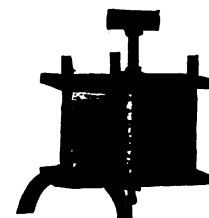
N A A—ARLINGTON TUNER—5,000 M.

This tuner is same size as above tuner only it has a tickler coil and uses the straight audion hook-up with tickler in series with phones. It is the only spark tuner that gets NAA on a small aerial without any variable manual coupling. This tuner also gets the arc signals at 5,000 meters and records easily wireless phone talk from 600 to 5,000 meters. Priced at \$15.00 plus parcel post.

KNOCKED DOWN OR ASSEMBLED CONDENSERS

Which kind do you want? Made for panel mounting and are complete with scale, pointer and knob. Used all over the world. No C. O. D. orders, add Parcel Post. Buy from your local dealer or send us his name if he can't supply you. Formica tops and bases. Movable plates are now held by nuts and not clamped with washer as formerly

11 Plate K.D.	.....\$1.80
21 Plate K.D.	..... 2.25
41 Plate K.D.	..... 3.20
11 Plate assembled	..... 2.75
21 Plate assembled	..... 3.25
41 Plate assembled	..... 4.25



UNIVERSAL CONDENSER

The only fool proof, complete assembled condenser in the world that will fit any cabinet, and take the place of any and all the condensers that you may be using. IT HAS A CONTINUOUSLY VARIABLE CAPACITY FROM .00025 MF TO .001 MF. Studs are so mounted as to prevent any leakage and to fit any holes you may have already drilled in your panels. Size 3x3x1 inches and shipping weight one pound. Priced at \$2.50 and add Parcel Post.

Sold by

TRESCO, Davenport, Ia.

or your dealer.

Be a sport and send 5c for our Catalog. Foreign orders solicited. Canadian Amateurs buy from Canadian Dealers. All products licensed under Marconi and Armstrong Patents.



ERRATA

The tenth line of the Tresco advertisement in the September number of "Pacific Radio News" should have read of feet in the last issue due to a typographical error.

When writing to Advertisers please mention this Magazine

ANNOUNCEMENT

KENNEDY EQUIPMENT

THE Kennedy Line of Receiving Equipment has made an enviable reputation for design, workmanship and performance wherever used.

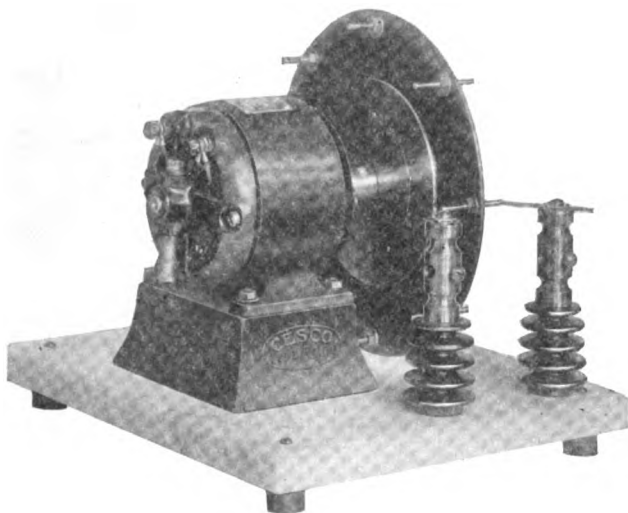
OUR recently augmented engineering staff now includes electrical and mechanical engineers with wide experience in the design and operation of such well-known High Power Stations as BORDEAUX, ANNAPOLIS, SAYVILLE, ARLINGTON, PEARL HARBOR, CAVITE, SAN DIEGO and EL CAYEY, which transmit across the Atlantic and Pacific Oceans.

THE purpose of this enlarged organization is to supply even more effectively the transmitting and receiving requirements of the radio experimenter who is satisfied with nothing short of the best. Kennedy equipment is being sold by leading dealers in some localities; other territory is still open.

THE COLIN B. KENNEDY COMPANY

RIALTO BUILDING

SAN FRANCISCO



CESCO R300—Price \$75.00

NEW! ---

**Not a Plaything
A Clean, Sharp Break**

**Give That Little
Condenser a Chance**

Our dealers now carry our lines

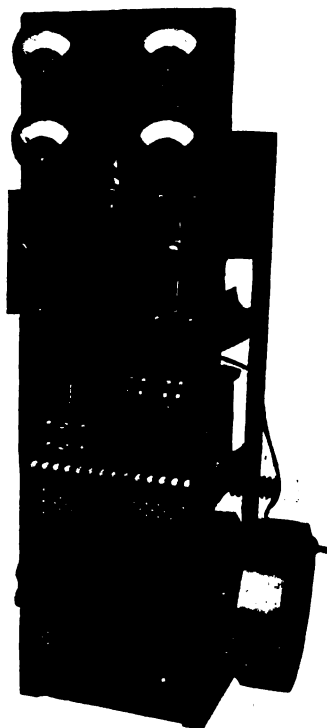
WE DISTRIBUTE HIGH-GRADE RADIO APPARATUS

California Electrical Supply Company

643 MISSION STREET

SAN FRANCISCO, CALIF.

When writing to Advertisers please mention this Magazine



do you know

- that** the Independent Wireless Telegraph Company operates and controls the radio equipment on more vessels under the American flag than any other wireless company.
- that** the Independent has the most up-to-date commercial radio station in the U. S. from ship to shore communication.
- that** Independent equipment has been designed by pioneer radio engineers.
- that** Independent apparatus gives greater efficiency in proportion of power input than any other similar wireless equipment.
- that** the Independent was organized by leading steamship owners who realize the value of efficient and reliable radio service.
- that** the Independent will lease or sell outright wireless equipment for vessels. The Independent offers to ship owners a service that will take over the entire operation and maintenance of wireless equipment regardless of type or manufacture.

INDEPENDENT WIRELESS TELEGRAPH CO.

GENERAL OFFICES—42 BROADWAY, NEW YORK

Pacific Division—110 Market St., San Francisco

BRANCH OFFICES IN ALL PRINCIPAL PORTS OF THE UNITED STATES

Dealers and Amateurs!

On and after October 1, 1920
the price of

BALDWIN TYPE "E" PHONES

will be TWENTY DOLLARS

DEALERS:

WRITE FOR OUR NEW PROPOSITION ON BALDWIN PHONES
AND NEW FIRTH SPECIALTIES

JOHN FIRTH & COMPANY

81 NEW STREET

Sole Distributors

NEW YORK



Skinderviken Transmitter Button

SUPERSENSITIVE

Pressure and Sound Waves reproduced electrically forms the basis for the most interesting study in speech and sound transmission. Scientists and experimenters recognize THE SKINDERVIKEN TRANSMITTER BUTTON as the peer of adaptability and sensibility, consuming a minimum current.

THE ONE TRANSMITTER THAT STANDS UP UNDER HIGH AMPERAGES

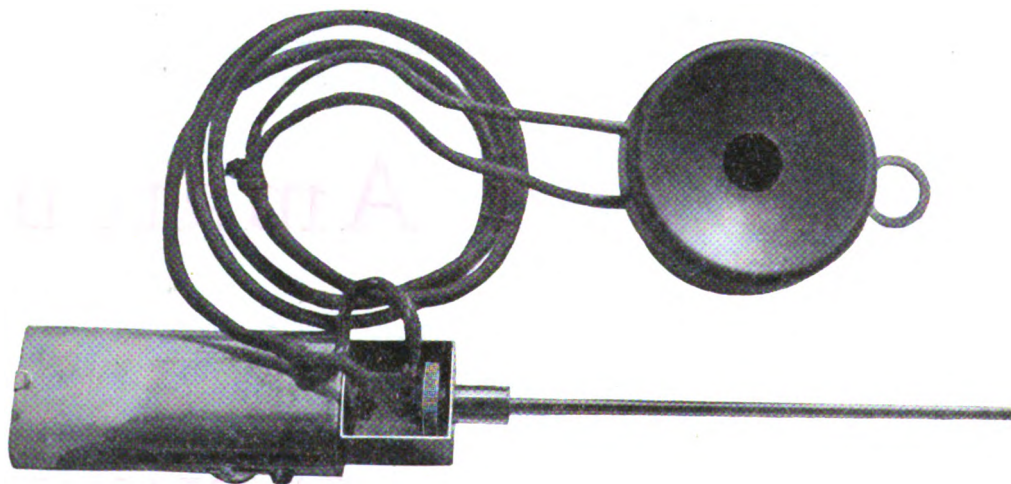
Highest Results in Wireless Telephony by using
Skinderviken Transmitter Button

\$1.00

SEND FOR ONE
OR ASK YOUR DEALER

\$1.00

SKINDERVIKEN MECHANICAL STETHOSCOPE



DETECTS ALL INTERNAL NOISES IN RUNNING MACHINERY. THE ONLY SUCCESSFUL TROUBLE DETECTOR OF ITS KIND ON THE MARKET. INDESPENSABLE FOR ALL MECHANICS AND AUTOMOBILE OWNERS.

\$5.00 GUARANTEED \$5.00

General Sound Transmission Corporation

Sole Manufacturers and Dealers in Skinderviken Products

220 WEST 42nd STREET

NEW YORK CITY

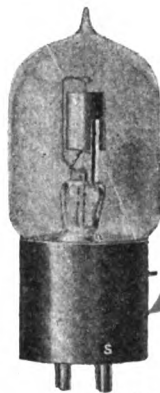
B6

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

"USE THE TUBE THE NAVY USES"

This is the letter received by our Laboratories following the record trans-Atlantic flight of the U. S. Navy flying boat NC-4, using A-P VT Amplifier Oscillators.



THE A-P VT
AMPLIFIER-OSCILLATOR
equipped with the SHAW standard
four-prong base—price \$7. Order from
your dealer.

U. S. N. S.
BUREAU OF STEAM ENGINEERING, NAVY DEPARTMENT
AND OFFICE TO THE
ENCLOSURE
NO-202

NAVY DEPARTMENT
BUREAU OF STEAM ENGINEERING
WASHINGTON, D. C.

July 5, 1919.

Moorhead Laboratories,
San Francisco, Cal.

Gentlemen:

While on the Trans-Atlantic flight the Moorhead tubes gave such excellent service, that I feel it my duty to personally tell you of their performance and send you one of the tubes used and a portion of the lead fish that held down the antenna to which the receiving equipment was connected.

During the trip your tubes made it possible to receive signals from the Norfolk Radio station while the NC 3 was on the water near the Azores, a distance of 2300 miles. But the longest record of reception of radio signals in any type of plane while in flight was far surpassed when signals were received from a ship 1800 miles away. This enviable record is even more distinguished from an aviation point of view in that your tubes required but half the power used by other types of tubes, thus saving many valuable pounds in weight of storage batteries.

Thanking you for the valuable part that you have taken in the first Trans-Atlantic flight and with best wishes for your continued success, I am,

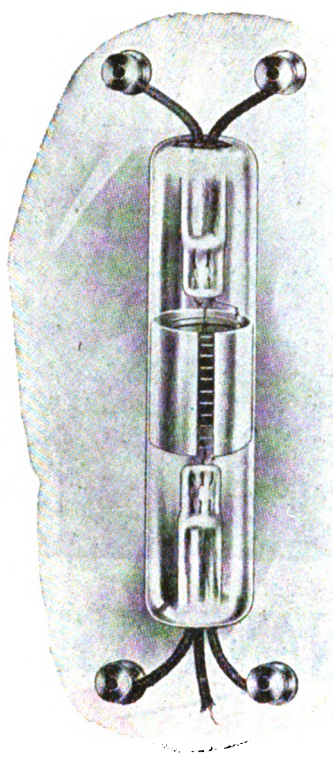
Very respectfully,
Robert A. Tarcander
Radio Officer NC Seaplane Division 1,
Trans-Atlantic Flight.

A-P Audions
manufactured
under the
De Forest
Audion and
Fleming
patents.
Other patents
applied for and
pending.

PACIFIC RADIO SUPPLIES CO.,
638 Mission St., San Francisco, Cal.

ATLANTIC RADIO SUPPLIES CO.
8 Kirk Place, Newark, New Jersey

Distributors for Moorhead Laboratories, Inc.



Positively Your Last Opportunity

to purchase the Original Tubular,
Vacuum Detector, Amplifier
Oscillator so well known as the
double-filament, double-life, hand
made

AUDIOTRON

In Constant Service Since 1915

AUDIOTRONS, recognized as the most sensitive detectors ever produced, are now free and clear of all patent difficulties. By agreements entered into with Radio Corporation of America, AUDIOTRONS are manufactured under the following patents: Nov. 7, 1905; Jan. 15, 1907; Feb. 18, 1908. Licensed only

See your dealer at once, or order direct. Be sure to benefit by this last opportunity to secure a HAND-MADE, SUPER-SENSITIVE, DOUBLE FILAMENT

\$6.00

Each. No increase
in price

for amateur or experimental uses in Radio communication. Any other use will be an infringement of the above patents.

AUDIOTRONS are no longer limited to audio frequency and can now be used as detectors and oscillators as well as amplifiers.

AUDIO-TRON DETECTOR, AMPLIFIER, OSCILLATOR. Insist on the name AUDIO-TRON on every tube you purchase. Fully guaranteed.

Dealers and Amateurs! Send at once for advance information on the NEW

AUDIOTRON

DETECTOR

AMPLITRON

AMPLIFIER

OSCILTRON

OSCILLATOR

mounted on the standard four-prong base. These NEW TUBES will be ready for delivery about October tenth. A valuable bulletin on these new

fully licensed tubes is now being prepared. See your dealer today. If he cannot supply this Free Bulletin, send us his name and address and we will mail you an advance copy of Bulletin No. P-170.

DEALERS, JOBBERS—If you are not on our mailing list, write us immediately.

AUDIOTRON MANUFACTURING COMPANY

(Successors to The AUDIOTRON Sales Co.)

Dept. N. 35 Montgomery Street

San Francisco, Calif.



SEND FOR OUR CATALOG

Ask Your Dealer To Show You Our Goods

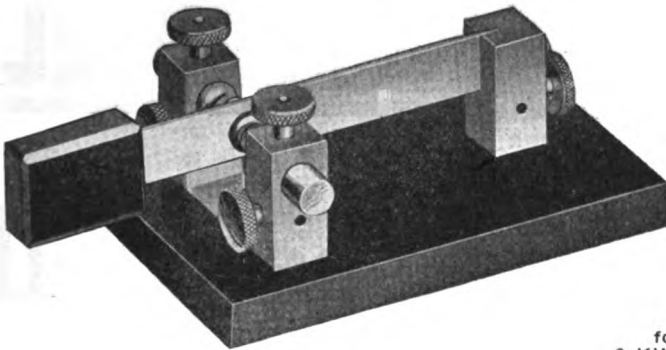


MANUFACTURERS—JOBBER—RETAILERS

ROTARY GAP No. YM-1

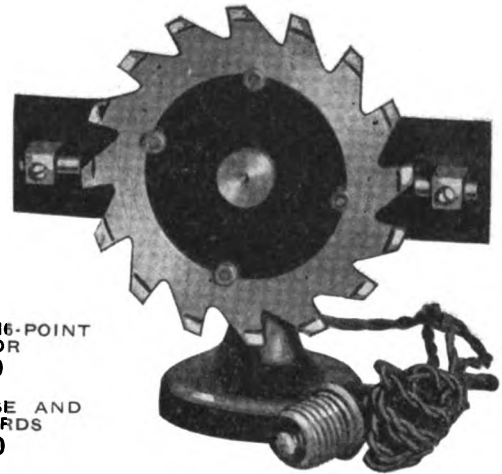
A new development in the rotary line has been made expressly for Young & McCombs. Improvements on the well-known saw tooth rotary wheel make this gap the equal in tone and efficiency to any selling for twice the money. It is the only gap on the market which will run smoothly and reliably in either a horizontal or vertical position. Can be run in a vertical position while screwed to the wall. Rotor is machined cast aluminum with formica center. Has liberal sparking space and is drilled for either 1/4 or 3-16 shaft. Variable motor speed switch in base.

PRICE—Completely Assembled—\$16.00



SAW-TOOTH 16-POINT
ROTOR
\$4.50

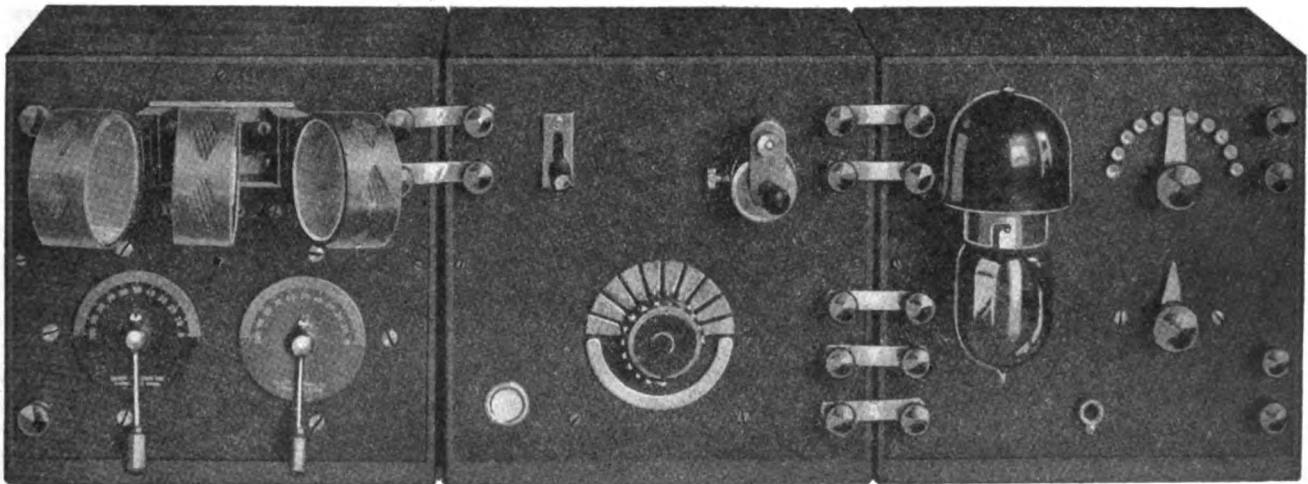
ROTOR BASE AND
STANDARDS
\$7.00



"COOTIE" KEY No. YM-6

The "Cootie" key is the snappiest sending device offered on the market for reliable spacing of characters. Large standards, formica knob, substantial silver contacts suitable for use up to 2 KW. The double action of the "Cootie" key lends an individuality to your sending. Price, Nickel-plated \$5.00.

UNIT SECTIONAL CABINET RECEIVERS



YM-7b

YM-9

YM-4e

A typical unit sectional cabinet receiver is here shown. We are the sole originators and designers of this type of receiver. Cabinets are of quarter sawed oak with "Early English" finish. Bakelite panels. Audion cabinet contains 60 volt variable "B" battery. This set, with proper honeycomb coils, is operative from 150 to 20,000 meters. Amplifiers may be added to these sets in any number. The crystal detector cabinet includes an enclosed buzzer and battery. All instruments can be supplied separately or in complete sets.

TUNERS
YM-7b—With plain mount.....\$29.50
YM-7a—With geared mount..... 32.50
(Less Coils)

CRYSTAL DETECTOR
YM-9 Complete with test buzzer
and battery\$24.50

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S O S again Captain-Clear as a Bell

Faintly the call of a disabled passenger liner reached, the wireless room of the destroyer Falcon. A report to the bridge brought the captain rushing into the wireless room to get first hand news. Operator Nelson clamped his faithful Baldy phones tightly over his ears and waited breathlessly for a repeat.

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Baldwin Phones made good for operator Nelson. They have been making good for the U. S. Navy, the British, French and other foreign governments. The professionals all over the world chose Baldy Phones because their experience has proven them to be most sensitive.

From a standpoint of value received, Baldwin Phones are low priced. You obtain the equivalent of two mica diaphragm phonograph reproducers—two electro-magnetic amplifying mechanisms of the famous Baldwin design in addition to other accessories.

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PACIFIC RADIO NEWS



RADIOTORIAL

PUBLISHED MONTHLY

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Editor

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Advertising Manager
50 Main St., S. F., Cal.

December issue forms close on November 1.

BY THE EDITOR

OUR FIRST PACIFIC COAST CONVENTION

DURING the Thanksgiving holidays, Thursday, Friday and Saturday, November 25, 26 and 27, San Francisco will be the playground for all of the Pacific Coast radio men. The object of attraction will be the Pacific Coast Radio Convention, the first affair of its kind ever held on the Pacific Coast.

The convention will be thoroughly RADIO from beginning to end. Delegates from Pacific Coast radio clubs and associations, representatives from the Army, Navy, Department of Commerce, United States Shipping Board Radio Division, United Radio Telegraphers' Association, Institute of Radio Engineers and all radio apparatus manufacturers will be present.

The opening feature will be a speech given by radio and received with the aid of loud speakers, and Magnavoxes. Manufacturers will outline their past, present and future work, and will exchange useful ideas in production, marketing and administration work of their factories.

Amateurs will have an important part in the convention activities and will tell of conditions "in the air" in the vicinities of their homes, which cover a territory from Mexico to Canada and the Pacific Ocean to the Middle West. Clubs and associations are sending delegates who will contribute to the entertainment and who will be shown the interesting radio sights of the local country.

During the day time sight-seeing tours will be held and many radio stations, laboratories and factories will be visited. These tours will be highly interesting and educational. No man who is interested in the radio game should miss being in San Francisco during the convention.

The Pacific Coast Radio Convention

IF YOU CANNOT COME TO THE
BIG CONVENTION WE WILL BRING
IT TO YOU THROUGH THE COLUMNS OF THE

Convention and Christmas Number of *PACIFIC RADIO NEWS*

IF YOU ARE NOT A SUBSCRIBER
WE WILL SEND YOU A COPY
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OF YOUR NAME AND ADDRESS
ON A POSTAL CARD.

Another of the features of the convention will be the radio show. Manufacturers of radio apparatus will have booths to demonstrate their radio apparatus. Every known make and type of radio apparatus will be shown. Old apparatus of the "good old days" and some of the very latest types of equipment will be shown, and also some very extremely interesting relics from the world war. Laymen as well as radio men will visit the show, as it will be open to all.

The last night will be one of great note and will, no doubt, never be forgotten in the annals of radio history and development. A banquet and radio ball, surpassing anything of a similar nature ever given, will be held. It will be a great event. Novel centerpieces and surprises appropriate for the radio interested crowd will be seen at the banquet.

Among these will be speeches spoken by radio telephone.

Radio music will be used for the ball entirely. The opening selection will be played by the California Theatre symphony orchestra, which will be playing at the theater while the music will be transmitted by radio to the ballroom, and will be heard there just as if a real orchestra were right in the room.

The first exclusively radio speed contest in sending and receiving will be held at the show. All operators who have famous "mitts" are invited to participate, as are also those who can copy legibly by hand or typewriter at a speed of anywhere from thirty to forty-five words a minute, or even faster in Phillips' Code.

Every single person interested in radio transmission and reception should make it a point to be present, as it will be an event worth seeing or participating in.

THE PACIFIC COAST RADIO CONVENTION is marking an epoch. This epoch, in making present-day history, is one of peace and prosperity. By the latter is not meant the lavish, extravagant so-called prosperity of war days, but a settled, sane prosperity, which reaches into the small corners where poverty was once existent.

Manufacturers are turning to the serious problem of development of radio apparatus, carefully and systematically working to produce equipment which will actually do service worthy of commendation. No more are we hampered by the tremendous press of wartime production, which gave us no time for proper reflection or even a "breathing spell." Now we are back to the time when the buying power of the dollar will mean more, and

(Continued on page 105)

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1306 Hartford Bldg.

Seattle Office.....419 Pioneer Bldg.
London Office.....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARDCOMPANIES PLAN TO EXCHANGE
PATENTS IN WIRELESS FIELD

PATENT and scientific discoveries in the fields of wireless telegraphy and wireless telephony are to be exchanged by the American Telephone and Telegraph Company and the General Electric Company under the terms of a contract which has been entered into between the two concerns.

Negotiations which led up to the contracts were begun after each company had received letters from the Bureau of Steam Engineering of the United States Navy, in which the bureau gave the opinion that the interests of all would be served best by some agreement between the holders of permanent patents.

"The world-wide wireless system of the Radio Corporation of America, in which the General Electric Company is interested, coupled with the universal service of the Bell Telephone System, are thus brought into harmonious relation," said H. B. Thayer, president of the American Telephone and Telegraph Company, in discussing the amalgamation.

"This will facilitate the use by the public of the present wireless telegraph facilities of the Radio Corporation, and, as the art advances, will enable the American Telegraph and Telephone Company to extend its telephone service to ships at sea and to foreign countries." —San Diego "Union."

THE amateur radio license of R. P. Fleming (6KH), 606 San Benito street, Los Angeles, Cal. has been suspended by the Radio Inspector of the Sixth District for an indefinite period. Fleming was found guilty of interfering with distress signals from a seaplane working with the Inglewood Navy Station. Requests to stop transmitting were ignored by Fleming. His apparatus was ordered completely dismantled.

ANEW high-power radio station, capable of transmitting 12,000 miles, has recently been dedicated in Berlin, Germany. Members of the American Mission and the German government were present at the opening ceremonies and a message announcing the opening of the new plant was sent broadcast.

RADIO COMPASS ROBS FOG
OF TERRORS

SKIPPERS will chuckle if fog envelops the sea lanes into San Francisco Bay, for Uncle Sam will be extending a guiding hand to steer all steamers safely past the dangers of shoals and rocks when navy radio compass stations will start their work of cutting terrors out of fogs.

Four radio compass stations are new guardians of the Golden Gate, having been established at Point Reyes, Bird Island, Point Montara and Farallon Islands. They will furnish bearings to steamers free of cost. No other means exists to obtain bearings when fog obscures the landmarks and vessels are not within sound of submarine bell warnings.

The principle involved in the operation of the radio-compass stations, is that the vessel sends signals by wireless, and the four radio compass stations, determine from which direction these wireless waves come, by means of a special radio-compass receiving apparatus. Each of the four stations then sends out a message showing the precise direction of the vessel from the station.

The master of the vessel, by charting these directions on the pilot charts which give location of the compass stations, can determine by the intersection of these direction lines the precise location of the vessel.

Canadian radio stations make charges for this direction finding service, while all United States Navy radio stations furnish this service to mariners without charge.

With the opening of radio-compass stations off San Francisco Bay, Lieutenant Commander McCaughey requests all mariners to make use of these stations in clear as well as foggy weather, for training of personnel and visible check on accuracy of bearing.

Lieutenant Commander McCaughey announced that the corrected precise location of the four radio-compass stations follow:

Point Reyes—Latitude 38 degrees 2 minutes 30 seconds north; longitude 122 degrees 59 minutes, 28 seconds west.

Bird Island—Latitude 37 degrees, 49 minutes 25 seconds north; longitude 122 degrees 32 minutes 11 seconds west.

Point Montara—Latitude 37 degrees 32 minutes 10 seconds north; longitude 122 degrees 31 minutes west.

Farallones—Latitude 37 degrees 42 minutes 6 seconds north; longitude 122 degrees 59 minutes 58 seconds west.—S. F. "Bulletin."

DR. D. W. REYNOLDS, a wireless telephone enthusiast of Colorado Springs, Colorado, has frequently heard the radio telephone at Catalina Island. "At first I thought that I had cut in on Denver telephone calls, because the voices were so clear," Dr. Reynolds is reported as having stated in discussing the matter, according to the San Francisco "Bulletin." "I could hear these voices, halfway across the continent, as if they were right here in Colorado Springs, talking over land telephones," Dr. Reynolds further states.

THE Radio Corporation of America announces the opening of its new shore-to-ship radio station at Marshall, California. A two k.w. 500-cycle spark set has been installed and will be operated by remote control. The call letters of the new station are "KPH," formerly used by Hillcrest, San Francisco.

A 5 K.W. spark equipment and an undamped wave transmitter will be installed at the station in the near future.

THE International Berne Bureau announces that, effective October 5, 1920, the following conventional signal will be placed in effect:

Abbreviation:

QTC

QUESTION,

HAVE YOU ANYTHING TO
TRANSMIT?

ANSWER,

I HAVE SOMETHING TO
TRANSMIT.

The same circular abolishes the present question for the signal QRU and makes it an answering abbreviation only, as follows:

QRU—I have nothing to transmit.

THE Compagnie Generale Sans Fil, of France, by reason of a pre-war contract which gave them control of Dr. Goldschmitt's patents, are now demanding that the trans-oceanic station at Elvisse, Germany, be turned over to them for operation. The peace treaty makes their claim legitimate. The patents referred to are those covering the Goldschmitt high frequency alternator, the rights to which the Federal Telegraph Company acquired from the Hochfrequenz Maschin Co., Berlin, in 1914. By reason of this agreement the French company also became possessor of the Tuckerton, N. J., Station.

Arc Radio Apparatus

By Jennings B. Dow

Published by Permission of the Secretary of the Navy

Part III

FIGS. 5 and 6 show typical current-time curves of arcs used for radio purposes. It will be noted that the arc is extinguished once during each cycle, and that in Fig. 6 the inertia of discharge evidenced itself by a complete reversal of the current, shown by the portion of the curve below the time axis.

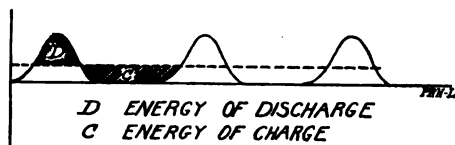


Figure 5

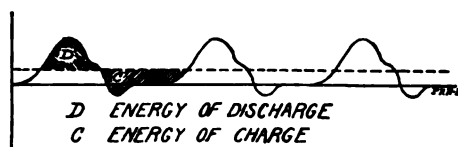


Figure 6

Design

While no intent is made to cover thoroughly all details of design of arc apparatus, it is hoped that the following information may be applied in such a way as to permit the experimenter to design for himself good workable apparatus in powers up to five kilowatts.

The converter consists of electrodes, chamber, cooling system, electro magnet, and hydrocarbon feed system.

Since the electrodes are of a primary importance, and because upon their arrangement depends the design of so many other important parts of the apparatus, these will be taken up first. Fig. 7 shows three types of positive electrodes typical of small Poulsen arcs. In A, a copper tip is brazed to the end of a brass tube in which water is circulated for cooling purposes. A tip

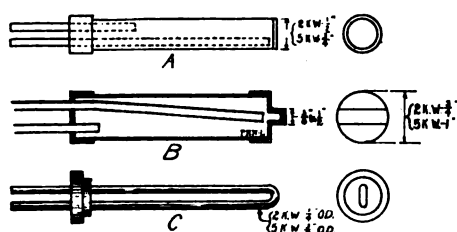
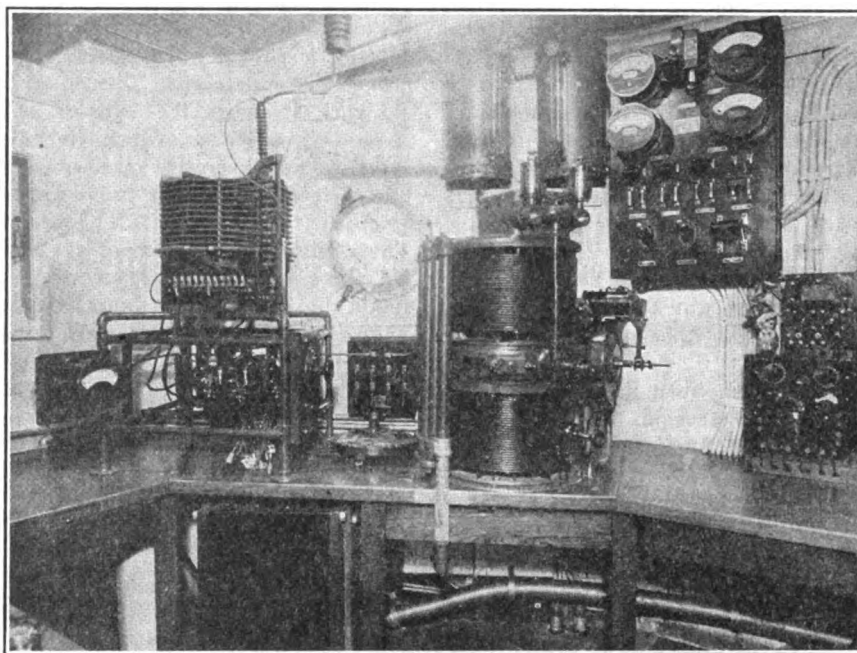
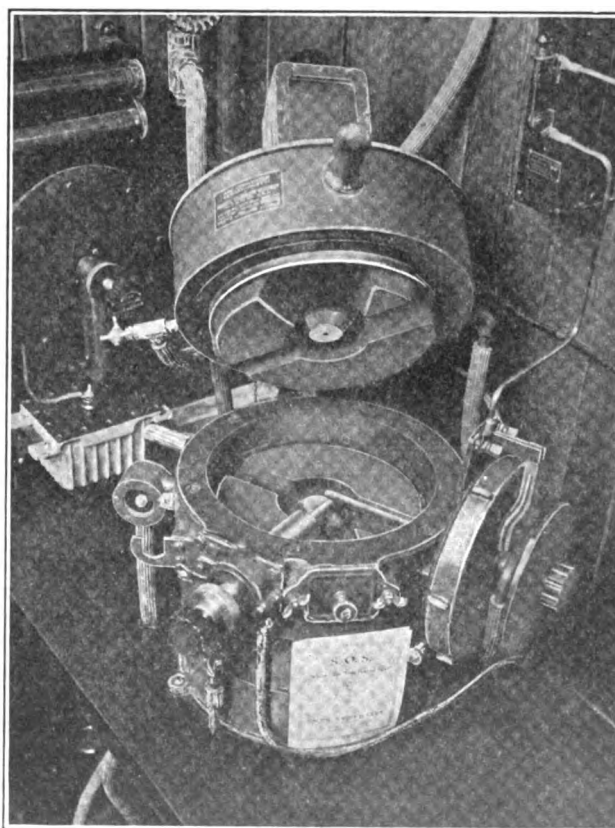


Figure 7



The 5 K. W. Federal Arc Installation on the U. S. Army Transport "Mount Vernon."



An interior view of the 2 K. W. Federal Arc Converter in use at The Pacific Radio School in San Francisco. The Carbon Electrode is slowly rotated by means of a $\frac{1}{4}$ H. P., D. C. Motor. Note the handle on the end of this Electrode. It is used for striking the Arc. The copper Anode remains in a stationary position.



of this kind 3-32-inch in thickness, if properly cooled by water or oil, will last for several hundred hours of constant operation in arcs operated at in-puts up to ten kilowatts. B shows a

(Continued on page 98.)

A SHORT WAVE REGENERATIVE RECEIVER OF HIGH EFFICIENCY AND UNIQUE CONTROL

(BY WILLIAM F. DIEHL*)

THE radio amateur in the United States must confine his operations to a wave-length of 200 meters and he is limited by law to a power in-put of 1000 Watts. Compliance with this regulation necessitates the use of a small antenna, making possible the radiation of a comparatively limited amount of power—since the radiated power is proportional to the radiation resistance, this resistance being equal to the ratio of height to wave-length, i.e. $R = \frac{40\pi^2 (AH)^2}{\lambda^3}$, R being the radiation

resistance, A the form factor (depending on physical dimensions of antenna), H the height of the antenna in meters, λ

powered stations at great distances, and because of its high efficiency and unique control, it should be of interest to the progressive amateur.

Figure 1 shows the exterior of the Type CR-6 Receiver, which embodies a short-wave regenerative receiver, vacuum tube detector, two-stage audio frequency amplifier, and special telephone jacks which automatically control all circuits. All these elements are combined on a single Bakelite-Dilecto panel, shown in Figure 2, which can be readily removed from the cabinet for inspection of all parts, and due to the disposition of the various elements, the leads are extremely short, making for high efficiency. The

receiver by (a) absence of stray and shunt capacities, (b) low damping of the various circuits—effected by the use of continuously variable inductances and heavy bus wiring, (c) a primary circuit of finely variable inductance and antenna series condenser, (d) a unique coupling

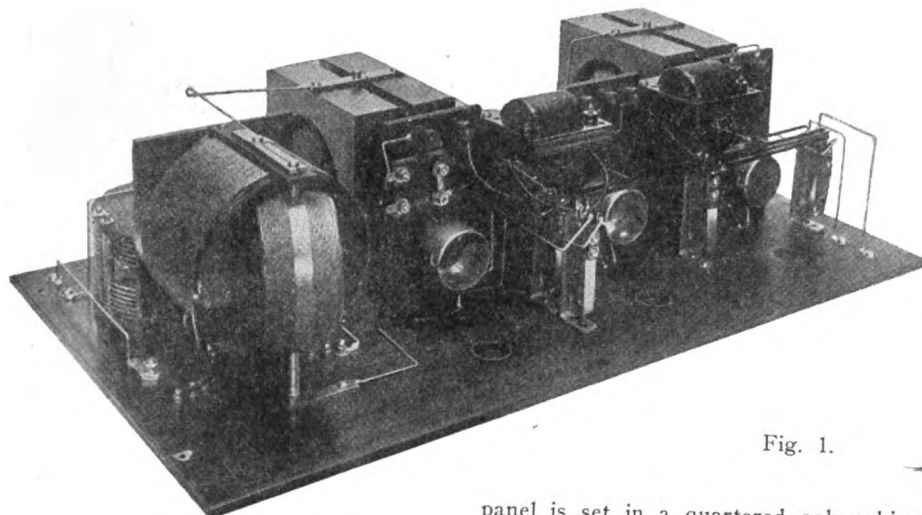


Fig. 1.

the wave length in meters. It is obvious that the two variables are the height and wave length, and since the height is limited by the wave length, and the latter fixed by law, it follows that the amount of power to be radiated by an amateur antenna is relatively low. Even with the finest equipment and most capable operation, it is rarely possible for the amateur to obtain a power output exceeding 600 watts. It would surprise the average amateur to know how little energy his transmitter actually radiates.

It is clearly evident that to communicate over great distances extremely sensitive receiving apparatus must be used, and because of the multiplicity of stations operating on the same wave length, receiving apparatus must also be selective to a high degree. To facilitate the reading of signals from great distances, amplifying apparatus is essential. The Grebe Type CR-6 Receiver was designed for the reception of signals from low

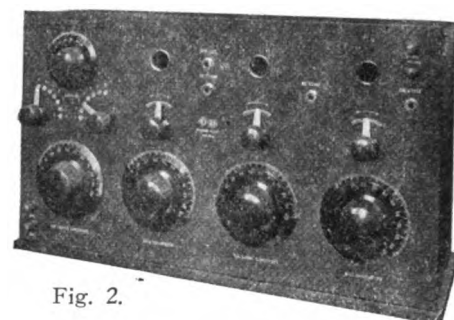


Fig. 2.

device, giving 0 to maximum coupling over the entire wavelength range.

The use of variometers has reduced the number of controls to a minimum, thus simplifying the tuning-in of signals from various stations. This makes the Receiver admirable for use in connection with traffic handling—the work now being done by members of the A. R. R. L. All knobs, switch and rheostat handles, as well as binding posts have been designed with a view to easy adjustment, and a plug-and-jack control system enables the operator to shift from detector, to first or second stage of amplifier-unit merely by inserting the plug in the proper jack. This plug-and-jack system also contemplates the use of a loud-speaker, which may be put in circuit in the same simple way. The CR-6 Receiver is less difficult to operate than a telephone switch-board.

panel is set in a quartered oak cabinet having a hinged top, permitting the insertion of vacuum tubes in their respective sockets, the complete apparatus requiring a space of only 22x13x7 inches. The controls have been reduced to a minimum and are so located as to afford simple and rapid adjustment of the various circuits.

The wave-length range of this receiver, 170 to 680 meters, is best suited for the experimenter and relay operator. This range includes all amateur stations, short wave radiophone stations, commercial ship and shore stations (300, 450 and 600 meters), experimental stations, and various aircraft and small Naval craft stations.

This receiver is extremely sensitive, due to (a) the amplification obtained by regenerative action and (b) audio-frequency amplification. The signal strength to be obtained by this apparatus is approximately 15,000 times that obtainable by the use of a straight audion hook up.

Maximum selectivity is obtained in this

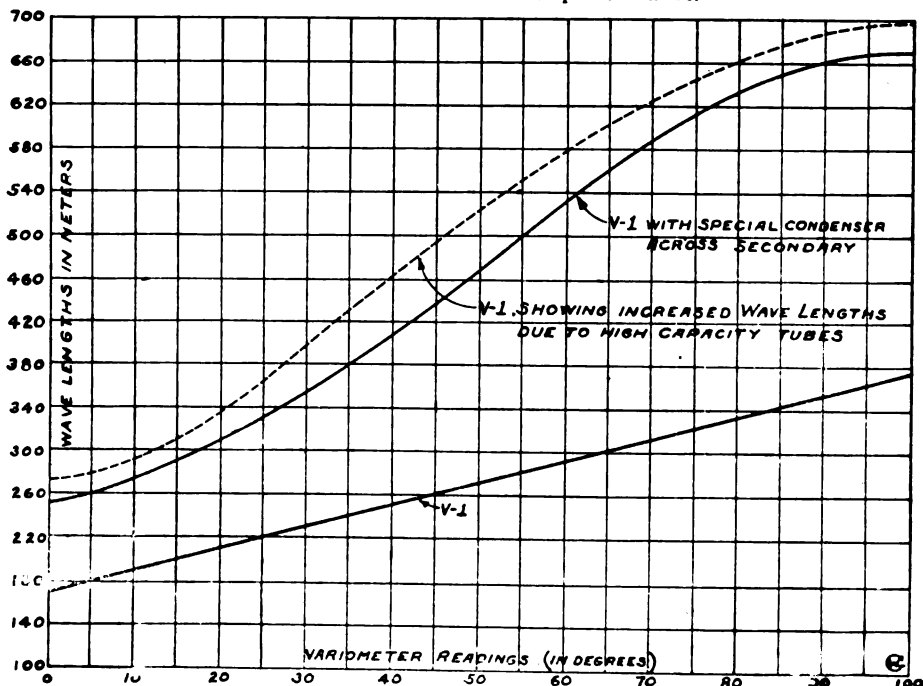
Referring to the wiring, Figure 3, primary circuit, consisting of an adjustable inductance, L, in series with the variable condenser VC. Referring to Figure 1, the two multi-point switches S and M give extremely fine adjustment of inductance. The dial marked "Ant. Series Condenser" controls a variable condenser. Coupling is effected by means of the coil L-1 (Fig. 3) which is controlled by the dial marked "Coupler." The variometer V, controlled by the dial marked "Grid Variometer," permits variation of wave-length, and the proper setting may be obtained by referring to a curve similar to Figure 4, which is furnished with each receiver. From this curve it may be seen that two ranges of wave length are possible, depending upon whether or not condenser FC is in

*Chief Engineer A. H. Grebe Mfg. Co.

[illegible]

The arrangement for high voltage is especially unique. There are three terminals, 1, 2 and 3. The voltage applied between 1 and 3 is the amplifier voltage, that between 2 and 3 the detector voltage. The terminals marked "20 volts" are used when it is desired to add additional voltage to the second stage tube. With a minimum of batteries, any voltage may be impressed on the plate circuit of any tube. This is very useful

1. Set the coupling dial at 50.
2. Set the Wing Variometer dial at zero.
3. Set the Antenna Series Condenser at 100, and adjust switch M to some medium point, say 4 or 5.
4. Rotate the Grid Variometer to the



Much might be written of the achievements of this Receiver, but it may be noted that during the recent QSS tests, a station using one of these instruments copied all the stations sending test signals from 1AW to 9LC—truly an unparalleled performance.

THE UPS AND DOWNS OF RADIO ON THE PACIFIC

BY THE STATIC HOUND

THE EDITOR threatened to use bodily force in keeping me out of the magazine this month, but here I am again. You see, fellows, it's like this: I am out of work and have lots of time to call on my radio friends around town and pick up a little news for you.

SOMEbody was sending out a "QST" a few weeks ago, inviting everybody to the San Francisco Radio Club. Mr. B. Linden, our Assistant Radio Inspector, was going to give a lecture. The Power Administrator of the state ordered that no electric signs be operated between the hours of 7 and 10 p. m. Consequently I had an awful time finding the club rooms. The QRM from a half hundred "sixers," radiating from the S. F. Gymnastic Club Building, gave me my bearings.

I set a westward course for the signals and arrived without further mishap. The meeting had already been called to order. Somebody was just making a motion that the Chairman be fined ten cents for smoking while the meeting was in progress. Everybody else was smoking, so why pick on the Chairman?

The Convention Committee was asked to report. Sgt. Lufkin had lots of good news for the members. He advised them to hold the convention in the Civic Auditorium. No decision was reached as to where the big affair will be held. At any rate, it's going to be the talk of the town and you will be the loser if you do not attend. A substantial advertising and publicity fund was appropriated. After the convention was marked from the board we had a lecture by Mr. Linden. Say, fellows, that speech was hot stuff from start to finish. Mr. Linden outlined the future possibilities of radio as a career and received a most hearty applause. There's going to be a speaker at the club every Tuesday evening. Come to the meetings—you are always welcome, except at the usual business meeting, which takes place on the first Tuesday of the month.

ASENDING and receiving speed contest for radio operators will be one of the many features of the radio show at the convention. A separate test will be held for operators with commercial licenses and another for those with amateur licenses. A bit of keen-cut sending will bustle forth from the "mitt" of one of our crack Pacific Coast operators. It is predicted that the contestants will "put down" forty words a minute and roll cigarettes between paragraphs.

MR. PAUL OARD, of the Oard Radio Laboratories in Stockton, dropped into the "PRN" office the other day and showed us a number of samples of his new radio equipment. Mr. Oard just purchased a dandy automobile—works as good as it looks. The same applies to his new line of receiving apparatus.

Mr. Oard is an old-timer in the radio game. He was operator on the S. S. "Fifield" in 1913. The "Fifield" was one of those deep-water vessels which draws little water. She drew so little water that in rainy weather she could sail up the gutters in San Francisco's main street and discharge her cargo at the City Hall.

THE Bay Counties Radio Club held its first social affair in Klinker's Hall, Oakland, on the evening of October 1st. Over 230 radio men were present. The house was filled to capacity and visitors were kept on the jump with a radio raffle, radio feed, jazz music and several speeches. Mr. E. W. Stone spoke on the old Bay Counties Wireless Association that was in its glory many years ago. Mr. Bessey unloaded on the "QRM" question. The sum of \$135.65 was realized from the raffle, for which the members received the following apparatus: 4 pairs of Murdock phones, one amplifying transformer, three honeycombs, one variometer, one Oard control panel, A-P tubes, one copy of Mr. Stone's book, "Elements of Radio Telegraphy," 2 V. T. sockets, three subscriptions to "PRN" and miscellaneous small parts. Messrs. Grubb, McNamee, Stone, Oard, Lambert, Berringer and Bessey were added to the list of honorary members.

JACK BINNS, hero radio operator of the "Republic" disaster, is writing for the American Magazine. His first article, "How People Behave When in Danger," appears in the November number.

THE following list of stations have all been worked by 7CU during the month of August, 1920. Who says radio is dead during the summer time?

5BR (Canadian), 6AS, 6AV, 6AR, 6BJ, 6BN, 6BQ, 6BR, 6CO, 6DK, 6DY, 6EA, 6EB, 6EJ, 6EP, 6EX, 6FS, 6GF, 6GR, 6IF, 6II, 6JD, 6JI, 6JM, 6JN, 6OC, 6OH, 6PQ, 6QR, 6SR, 6TC, 6ZE, 7AD, 7AN, 7BK, 7CE, 7CW, 7IN.

The correct address of the station operated by Maxwell P. Gilliland (6A CB) should be 1117 Foothill St., Pasadena, Calif.

THE operators' waiting rooms in the office of the large radio companies are called "Static Rooms." You can hear more lies than truth about distance records and sea-sick remedies in those "Static Rooms." One of the operators was telling me about his experience on the S. S. "Greenwood," better known as the "Bay Coroner," due to her renown as a wrecking cruiser. The vessel put to sea with the purpose of salvaging a wreck off the Eureka coast. A 5 k.w. generating plant in the engine room supplied the ship with power. A 2 k.w. radio set was installed in the wheel house. The operator had a message to send to NPM and asked the chief engineer for power to start his generator. "Listen here," said the chief, "only one thing runs at a time on this ship—either the wireless stops or the ship stops." Whereupon the ship was stopped for a sufficient length of time to enable the operator to clear NPM.

MR. D. B. MCGOWN, 6ZE, is building a complete ½ k.w. 500-cycle transmitting panel which is an exact duplicate of the Navy Standard type installed on many merchant vessels. He will use the new transmitter in his endeavor to reach Honolulu. He ought to be able to work Japan with that bunch of new efficiency hooked on the air.

A LITTLE pink-toed ether disturber with a half-inch spark coil sent us his application for the Honolulu test. If that fellow wins the contest I am going to present him with a handsome box of assorted wave lengths.

CALLS HEARD BY 6EA

6AE, 6AK, 6AAT, 6AAW, 6BQ, 6BR, 6OC, 6DE, 6DT, 6EJ, 6FE, 6FX, 6FY, 6GX, 6IC, 6JI, 6JN, 6MZ, 6OH, 6QM, 6QR, 6SR, 6TC, 6XZ and "PM" (QRA?)

Stations worked: 6AN, 6AT, 6AV, 6BJ, 6BN, 6CO, 6EP, 6EX, 6FS, 6SK, 6ZE and 7CU. A single electron relay was used in the reception of the above mentioned stations.

Stations heard and worked by 6EB are: 6AK, 6AN, 6AT, 6BJ, 6BN, 6BQ, 6BR, 6CC, 6CI (6CO), 6DK, 6DO, 6DT, 6DY (6EJ), (6EP), 6EX, 6FE (6FS), (6IY-Daylight), (6JI-Daylight), 6JN, 6JQ, 6JR, 6MZ-Daylight, 6OH (6QM), 6QR, 6QU, 6SR, 6UM, 6ZE (7CU).

The next issue of "Pacific Radio News" will be our combined Christmas and Convention number. If you are interested in radio at all you will miss a treat if you do not send for a copy of the big number at once. Better send us your subscription before you forget it.

THE EDITOR'S MAIL BAG

OUR READERS ARE INVITED TO SEND CONTRIBUTIONS FOR PUBLICATION IN THIS DEPARTMENT

East Orange, N. J., Sept. 9, 1920.

Mr. Paul R. Fenner,
Pacific Radio Pub. Co.,
San Francisco, Cal.

Dear Sir: That statement in your "Radiotorial" of the last issue of "Pacific Radio News," which says "be satisfied," makes me think. And it makes me think so hard that I shall attempt the expounding of a thesis on which I would appreciate your valued comments.

To introduce the theory we will take the supposed case of "John" and "James." John is the proud owner of a 1 k.w. transformer, while James has only a one-quarter inch spark coil. John, in view of his superior (?) equipment, will hardly speak to James now because he (John) claims he can transmit two thousand miles. He means to imply, I presume, that, with the average present-day equipment at the receiving end,—including with it a multious collection of vacuum tubes, their control panels, regenerative circuits, etc.,—his set will transmit signals that are audible two thousand miles distant.

But, let us see if John is justified in his claim to superiority. It is my intention, in the following, to show that the distance to which any transmitting station can actually transmit is infinite! And I mean this to imply regardless of the size or location of the transmitting station or the amplitude of the transmitted wave.

To make my meaning perfectly clear, let us take, for example, the analogy of a stone thrown into a pond of still water. When the stone strikes the surface of the water it causes circular ripples or waves to be sent out in all directions through the water; the point where the stone struck the surface of the water forming the center of these ripples or waves. Now, as the waves travel outward and away from this center of disturbance, they become less and less well defined until a point is reached where they are imperceptible to the human eye. We are led to believe, in consequence, that they are "absorbed." (So far, I believe, I am in perfect accord with the theories advanced by today's most noted radio engineers.) But are we, therefore, justified in assuming that because they are apparently absorbed that they in reality travel no further? Had we delicate and sensitive enough instruments at our disposal, it seems highly probable to me that we could detect the presence of these waves at the very extremities of this body of water, regardless of the size or magnitude of the transmitted wave and entirely irrespective of the

size of the body of water—be it a small pond, or a body of water the extent of Lake Michigan—provided only that our instruments of reception were sufficiently sensitive and that the waves, in their travel, met with no resistance.

This seems to be a perfect analogy of the transmission of those electro-magnetic waves termed "wireless," differing only in the medium through which transmission is effected. Due to the very nature of things, water, being matter, and possessing both weight and mass, must, of necessity, offer a considerable resistance to the progression of any waves that may be set in motion through it. But, in the transmission of electro-magnetic waves, we meet with no such obstacle. The ether—that intangible "something" which invades and fills all space—possessing neither weight nor mass, offers no resistance to electro-magnetic wave transmission and permits these waves to be conveyed through it with a speed sufficient to carry them a little over thirteen times around the earth in a single second! If we were given an infinitely sensitive receiver, there is nothing to prevent the reception in China (or Mars, for that matter) of waves emitted from a buzzer in Alaska!

All in all, O.M., it is the sensitiveness of the receiver rather than the power of the transmitter that is responsible for present-day long-distance communication. To me (in my ignorance), the development of a really efficient receptor of electro-magnetic waves possesses unbounded possibilities. It is a strange fact, but nevertheless true, that today, with all our modern radio equipment of "super-sensitive (?) receivers; with all our "efficiency (?) bank-wound and honey-comb inductances, in conjunction with our multi-stage radio- and audio-frequency amplifiers; and, with all due respect to the radio marvels that have been accomplished in the past, and to the geniuses who have brought them into being—there is not one single bit more energy abstracted from the aerial now than there was in the days of the coherer!

Because man takes that same amount of feeble current (or less) from his antennae that he could obtain, and did obtain some fifteen or twenty years ago, and by its well-known trigger action when passed through a bank of his modern vacuum tubes, causes energy to be released from his "B" batteries out of all proportion to the received current, he foolishly and vainly boasts of being almost able to transmit power by wireless! Better, by far, bend his energies toward

developing some method or device that will enable him to consign to the junk pile his multi-steps of amplification, by making use of a little more of the unused energy that is, assuredly, already in his aerial!

And this result will not be brought about by being satisfied with present conditions!

I assure you that your views on this interesting subject will be greatly appreciated and I shall look forward to your reply with considerable interest.

Cordially yours,

GEORGE N. GARRISON. 2AWM.

We will appreciate any further comment from our readers on this interesting subject.
—Editor.

San Francisco, October 8, 1920.
Editor, "Pacific Radio News,"
San Francisco, Calif.

On October 4th at 8PM, 6BJ, located at Burlingame, Cal., worked 7AD in Seattle. A card received from 7AD reads as follows: "I don't know what I am going to do with you down there. You drown out the Portland and Tacoma fellows and most of the local stations. Have read you through NVL (Seattle) 5 K.W., five miles away." The card is signed by F. J. Brott, Seattle, Washington. A card from Mr. Dennis of San Fernando reads as follows: "Hearing you very QSA, louder than the fellows in Los Angeles, 20 miles away." Signed: B. H. Dennis.

Anyone hearing 6BJ will please write Hall Berringer, 714 Peninsula Avenue, Burlingame, Cal.

Yours very truly, 6BJ.
(What's the secret, Berringer? Ed.)

San Francisco, Cal., Oct. 8, 1920.
September 29, 1920.
Editor, "Pacific Radio News":

I noticed an article in your October issue which states that Mr. Neilson, operator on the "Newport" has received long distances on his Kennedy receiver. Now, on the "D. G. Scofield," we did even better work with the Colin B. Kennedy Company's set. On the last voyage to England Mr. R. S. Rheem of Oakland made the trip as Junior with me and he had a Kennedy set which we used practically all of the time. We copied San Diego press 4,000 miles in daytime and through heavy static. Signals were strong. We received Balboa and Annapolis time signals at London and Liverpool. I made sure of this as I had a bet with Mr. Rheem, of a Manhattan Cocktail, that it could not be done. I lost the bet and paid for the cocktail. We used only one Audiotron bulb and I may say that up to the present time I have not seen a receiving set that can equal this one. It surely is wonderfully efficient for arc and other undamped waves.

Yours truly, Carl E. Soderstrom.

THE AUDION OSCILLATOR*

By R. A. HEISING

1. Introduction

AMONG the great inventions, developed in peace times but made use of in the late war, are the radio telegraph and telephone. They are recognized as most useful instruments of commerce, especially as instruments for safe sea travel. The wide use possible of radio apparatus necessarily makes for wide use of its most important apparatus element—the audion or vacuum tube,—and causes anything said or written about the latter to take on more than usual significance. The audion is also extensively used in telephone work. These varied uses together with the great potential possibilities in other engineering fields make it necessary for the present day electrical engineer to know something of its construction and operation.

The audion itself has been described in many articles up to the present, De Forest (Patent No. 879,532), Armstrong (Electrical World, Dec. 1914) (Proc. I. R. E., Mar. 1915), Van der Bijl (Phy. Rev., Sept. 1918), Vallauri (L'Elettrotecnica, Jan. 1917), Langmuir (Proc. I. R. E. 1915), and no attempt will be made to describe it here.

The audion, which is essentially an amplifier, is used for many other purposes. It is used to generate oscillations, detect oscillations, and modulate oscillations. The particular phase of its use to be discussed in this paper is that of generating oscillations. Audion oscillator circuits have to a certain extent been discussed by Armstrong, Hazeltine (I. R. E. April 1918) Vallauri, and in Bureau of Standard's Circular No. 74. Analytic studies of audion oscillator circuits were made by Hazeltine, Vallauri, the writer and others. In this article duplication of existing published work will be avoided where possible.

2. Scope

An analytic solution for an oscillator circuit, although giving much useful information regarding an oscillator's behavior, does not give the information necessary for the design of such circuits for power. It neglects many of the important factors which must be considered in securing best power conditions. The principal factors so neglected are: (1) the actual characteristic curve, (2) filament emission other than that of temperature saturation, and (3) the power absorbed by the grid input circuit. Such solutions give transient conditions, or requirements for oscillation. The neglected factors, though affecting these somewhat, produce their greatest effect after oscillations have begun by limiting the expanding current in the

transient state and bringing about the condition of stable, sustained, free oscillations. In conditions under which power is secured from an oscillator, all of these factors enter into the behavior of the oscillator and cannot be neglected. To treat analytically a circuit containing them leads to such complicated expressions that an experimental determination of the oscillator's behavior is much easier. The latter was therefore done and the principal results and deductions therefrom are given in the following pages.

In the study of oscillators, by experimental methods, the large number of variables entering into its behavior necessitates an extremely large number of experiments. It would be desirable, if space permitted, to give complete information regarding all these experiments. However most of them were of comparative unimportance or gave negative results and their discussion would be a waste of time. This paper will be confined to the more important matters, theory as well as practice, and where thought necessary experimental evidence will be given to support the statements made.

3. General Oscillator Circuits

An important trait, peculiar to all types of amplifiers, is that under proper conditions they may be made to produce free or sustained oscillations. Common examples are the electric bell, and the ordinary telephone set which can be made to "howl" by placing the receiver up to the transmitter. In both cases, variable current power is generated by a variable resistance, part or all is fed into an input operating device, phase relations in the input power are definitely set (this is especially observable in the bell), and a separate source of power (a battery) is used. The frequency is determined by the mechanical free periods,—the clapper and spring of the bell, and the diaphragms of the transmitter and receiver. A large number of purely mechanical oscillations might be named besides these two which are partly mechanical and partly electrical, but they all exhibit the same characteristics.

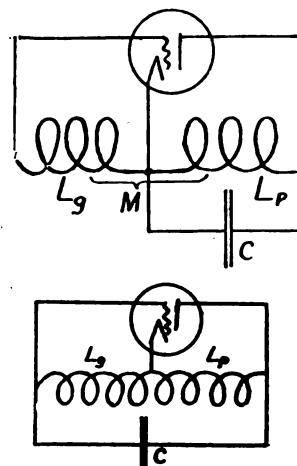
The audion, being essentially an amplifier, can also be made to generate oscillations. The same circuit conditions are necessary as for the example given. They are,

1. A circuit to fix the frequency.
2. A feed-back arrangement to impress some of the power from the output back into the input,
3. The proper phase relations for the impressed input,
4. A separate source of power.

The frequency is usually fixed by one or more tuned circuits. Oscillators can be made in which the frequency is determined by a condenser and a resistance, or an inductance and a resistance, but they are unsatisfactory for many kinds of work and are seldom used.

The feed-back arrangements for transferring power from the output circuit to the input circuit are innumerable. Fundamentally they all come under the heads of inductive, capacitive, or resistive coupling, but there is no particular manner in which the coupling must be accomplished.

The proper phase relation in the input power is of vital importance as regards the oscillator's operation. It is as important as the setting of the eccentric on a steam engine. The exact relations required are pointed out later.



The separate source of power used is generally direct current. It is not necessarily so as alternating current can be used if a single continuous frequency is not necessary. The power represented by the oscillation current all comes from the direct-current source. The oscillator acts only as a frequency changer, changing the power from zero frequency to that delivered into the oscillation circuit.

4. The Simple Oscillator Circuit

The two simplest types of oscillator circuits are shown in Figs. 1 and 2. They differ in a few points only. In Fig. 2 the oscillation circuit is $(L_g + L_p) C$, coupling to the plate circuit is the mutual inductance between L_p and L_g . In Fig. 1 the oscillation circuit is $(L_g + L_p) C$, and the coupling to the plate is the self inductance of L_p . Of the two circuits the former appears logically to be the simpler and more fundamental and the latter only a special case of it. Actually the latter is met with more often in practice. This is due to the inherent construction of the audion. If the audion were strictly a unilateral electrical device, a condition it approaches at low fre-

*Published by permission of the Publishers of the Journal of the American Institute of Electrical Engineers.

quencies, the circuit in Fig. 1 would unquestionably be considered the fundamental circuit. Actually, however, the inherent capacity between the plate and grid prevents us from obtaining this desired condition, and in many cases causes oscillators to behave according to the circuit in Fig. 2 instead of according to the circuit in Fig. 1. For this reason, Fig. 2 is considered the simpler of the two and will be discussed first.

The number of oscillator circuits possible is innumerable. They can, however, all be resolved into one of the simple circuits of the types shown in Fig. 1 or 2, by considering the elements L_p , L_s or C as being made up of complex circuits instead of simple inductances or capacities. The actual operation of the simple circuits can be shown in detail while for the more complex circuits, which do not lend themselves readily to mathematical analysis, the operation can be quite easily explained by resolving them into equivalent simple circuits and applying the theory of operation of the latter.

The simple Hartley oscillator in Fig. 2 will be explained first. The circuit as shown contains only the alternating current elements. The direct-current branches necessary to its operation may be brought in in a number of ways by inserting proper choke coils and condensers to keep the d-c. and a-c. paths separate. We are interested only in the a-c. operation at present and will therefore show only the necessary parts of the circuit.

The frequency in this oscillator is determined by the oscillation circuit ($L_p + L_s + 2M$) C . The resistance, audion output impedance, and amplification constant affect the frequency slightly, but it is mainly the reactance of the oscillation circuit which determines the frequency. The inductances L_p and L_s may be of approximately equal value with or without mutual inductance. The condenser is connected directly between the grid and plate and includes the capacity between these elements.

A simple explanation of how and why the oscillations occur is as follows:

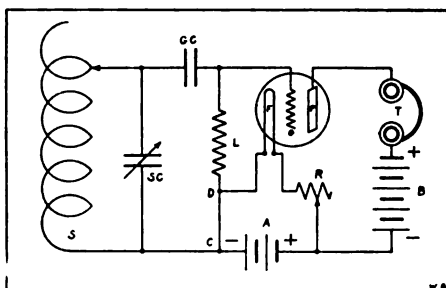
Assume to begin with, that in some manner an alternating voltage is impressed upon the grid. Such a voltage will cause an alternating current to flow in the plate circuit. This plate alternating current must flow through the inductance L_p or through L_s and C , or divide between these paths. The result is the same whatever path is taken, but for the purpose of a simple explanation it will be assumed that it all flows through L_p . In flowing through L_p this alternating space current produces an alternating e. m. f. This alternating voltage is the driving e. m. f. in the oscillation circuit and causes the oscillation current to flow. In flowing

through L_s the oscillation current produces an inductive voltage drop which because of the connection of the grid, is applied between the grid and the filament. This is the alternating voltage assumed to begin with as being applied to the grid.

(To be continued.)

GRID LEAKS

A GOOD deal of speculation has been caused, and some blind experimentation carried on by many operators who try, with more or less success, to use a grid leak in a vacuum tube circuit. The chief difficulty lies in the failure to understand the purpose of the leak, which is a very simple thing after all. The grid in any tube, whether it be a detector, amplifier, or oscillator, is really the control member on the tube, i.e., it controls the output and current flowing between the plate and filament. Now, for best results, the grid should have a negative potential impressed on it,



the value of which depends entirely on the characteristics of the tube, and the conditions of the circuit in which it is used. This can be obtained in several ways. The grid leak is one way which is very simple, and gives good results. It should be connected between the grid and negative pole of the filament, as it allows any positive charge, which may tend to accumulate on the grid to be neutralized by the flow of current, minute though it may be, from the negative terminal, which flows through the grid leak. The accompanying figure shows the method of connecting the grid leak in a simple detector circuit, and no change is necessary for using the leak in any detector, amplifier or oscillator circuit, as long as care is taken to connect the leak between the grid and negative pole of the A battery. A negative potential may also be impressed on the grid by the use of a grid, or "C" battery, or by the use of a "bias" resistance, which both impress a negative potential on the grid. A "C" battery of about 2 volts is connected in place of the grid condenser. To use a bias resistance, short circuit or disconnect the grid condenser, and connect a resistance of about 20 ohms between points C and D in the figure. The "C" battery possesses few advantages over the grid condenser,

and the bias resistance is especially recommended for amplifier circuits, especially.

A PECULIAR PHENOMENA

By C. I. Hoppough, Radio Engineer,
U. S. Signal Corps, Fort Mason,
San Francisco, Calif.

AN interesting and somewhat unusual fact was recently noted while a radio telephone equipment was in operation on one of the U. S. Army Transports running between San Francisco and Manila. The radio telephone set was tuned to a certain wave length and all parts of the equipment were given a thorough examination. Another check of the wave length was made during the latter part of the day for purposes of verification. It was noted that the wave length of the set had increased, although by only a few meters, and it was further noted that the "mush" from the South San Francisco NPG arc station was heard loudly on the same wave length. The arc "mush" stopped, apparently due to the fact that the arc had been shut down, and it was then noted that the wave length of the radio telephone set returned to its original point. It is thought that the energy from the arc "mush" caused a change in the ionization of the atmospheric layer between the antenna and earth of the telephone antenna, which in turn changed the capacity of the antenna, resulting in the noticeable change in wave length. Authorities on the subject state that no such action takes place. It would be of interest to hear from persons who have had a similar experience.—The Editor of this publication will be pleased to publish further comment on this timely subject.

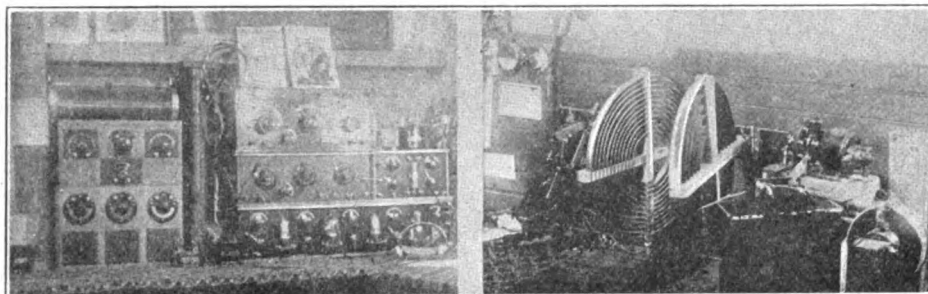
MR. R. M. KLEIN, manager Lee DeForest, Inc., San Francisco, has been called to New York to take a position with the home office, DeForest Radio Tel. & Tel. Company. While Mr. Klein's new position has not been announced, it is understood he will be General Manager of the Eastern Company.

Mr. Klein's successor in San Francisco is Ellery W. Stone, General Manager Pacific Radio Supplies Co., which company is taking over the manufacturing and sales work of the Western DeForest Company.

While no announcement has been made of any merger of the DeForest interests with those of the Pacific Radio Supplies Co., Mr. Stone will look after the affairs of both companies.

The extraordinary subscription offer advertised in our last issue expires on December 1st.

RADIO STATION 6AT, SAN JOSE, CAL.



MR. E. GARRATT ARNOLD (6AT) has sent us a photograph of his station which we publish herewith. The transmitting equipment comprises a 1 K.W. Thordarson transformer, Thordarson condenser, special type Thordarson rotary gap and an oscillation transformer constructed of one inch ribbon for the primary and three quarter inch ribbon for the secondary. Meters for indicating power and radiation are also used.

Several receiving sets are employed. The short wave units consist of a Grebe and Paragon regenerative receiver, audion detector and four-stage amplifier with Brandes phones. The long wave set is of the Western Radio, type LW make, with proper condensers and loading inductances.

An aerial consisting of four wires sus-

pending between two masts, 62 feet high separated by a distance of 48 feet, is used for short wave work. The long wave aerial is 200 feet long, 110 feet high at one end and 62 feet at the other. The ground consists of a number of cables and plates, buried in the form of a fan, directly under the antenna.

During the winter and spring season, the station established reliable communication with Seattle, Phoenix, Portland, Boise, Los Angeles, Salt Lake and San Diego. Signals from 6AT were reported heard in Des Moines, Iowa, by 9UA. A total of 117 messages passed through 6AT during the months of January and February, 1920. Signals from France, Japan, South America, Mexico, Canada, Alaska, Hawaii and the Philippines were copied on the long wave receiver with good audibility on two steps of amplification.

CALLS HEARD BY 7BH (Clive Scott, Salem, Ore.)

6EO, 6FE, 6EJ, 6KK, 6YM, 6BO, 6OH, 6BQ, 6AD, 6AE, 6BR, 6BW, 6PQ, 6TC, 6AV, 6AK, 6TS, 6DJ, 6JN, 6RA, 6CV, 6BK, 6AT, 6AAT, 6DQ, 6CR, 6AAW, 6JI, 6ABP, 6EN, 6JM, 6QR, 7BQ, 6BJ, 7CC, 6AAK, 6EK, 6VM, 7AD, 7CR, 7DP, 7CU, 7BP and 7BK.

Signals could be heard a foot from the phones from 6QR, 7BQ, 6BJ and 7CC. The radio telephone on the Avalon-San Pedro circuit as well as the DeForest phone in San Francisco have been heard several times.

NAPA RADIO CLUB ELECTS NEW OFFICERS

At a recent meeting of the Napa Radio Club the following officers were elected:

E. M. Swift, President.
G. Gerlach, Vice-president.
F. C. Simpkins, Secretary.
Mrs. M. L. Webb, Treasurer.
B. R. Norton, Sergeant-at-Arms.

Mr. M. L. Webb was retained as chief operator and instructor. After the closing of the ballots a social was held and speeches delivered by the newly elected officers. Code messages are sent to members three nights a week, between 8:30 and 9:30 P. M. by B. R. Norton from his station, 6JQ. The messages are transmitted on low power in order to avoid any possible interference.

BOOK REVIEW

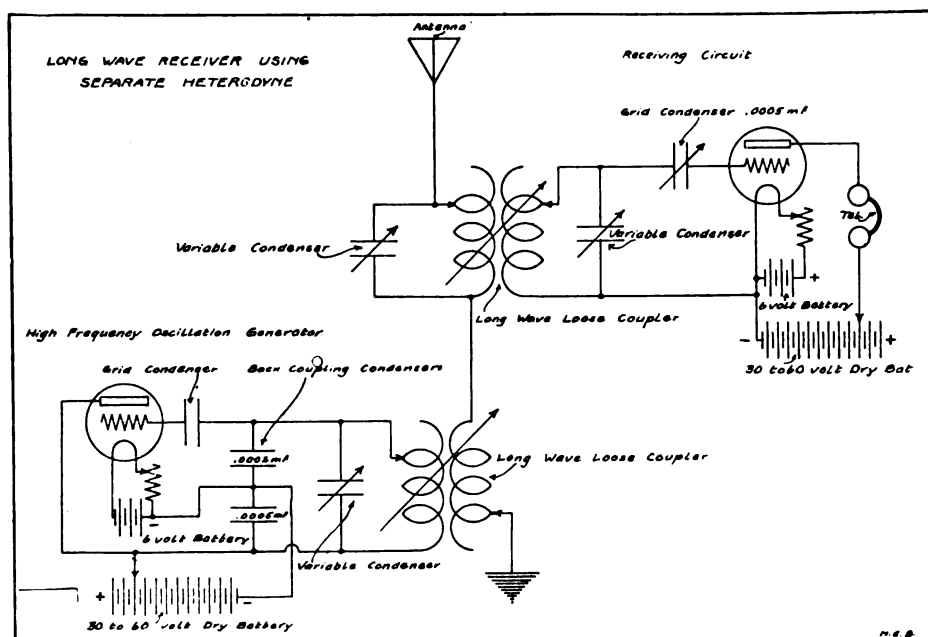
The second edition of the Consolidated Radio Call Book, dated July 1920, contains data on Shore Radio Station Calls; Ship Radio Calls; Telegraph, Cable and Radio Rates; Radio Compass Stations; Press Schedules; Weather Reports; Time Schedules; Amateur Calls and a Radio Map of the World. It has taken 160 pages to cover the aforementioned subjects in a thorough and reliable manner.

"Trans-Pacific Radio Operator's Log" is the title of a new pamphlet that will be ready for distribution on November first. The purpose of the log is to give the commercial operator full details of radio conditions on the Pacific Coast. Call letters, press schedules, wavelength data, weather reports, time signals and other valuable information will be contained therein. The authors of the book are W. Breniman and G. E. Knudsen.

In the last issue of "PRN" on page 54, we published a list of stations heard and worked by station 6UV. Credit for these call letters belongs to 6AR. 6UV, however, has succeeded in covering 850 miles with his radio telephone. His list of calls heard and worked was unavoidable omitted.

A GOOD HOOK-UP FOR LONG WAVE RECEIVER USING SEPARATE HETERODYNE

Courtesy of the Pacific Radio Supplies Co.



Cut out this Diagram and paste it in your note book. We will have another good one for you in the next issue of "Pacific Radio News."

HONOLULU TEST AROUSES INTEREST IN AMATEUR CIRCLES

SEVERAL of the most efficient amateur stations on the Pacific Coast will partake of the test to establish communication with Hawaii. Never in the history of amateur radio on the Pacific has such interest been aroused. Competition is keen; sets are being tuned and adjusted in order to radiate the maximum energy.

Final word is being awaited from Mr. M. A. Mulrony, Expert Radio Aide at the U. S. Naval Station, Pearl Harbor, Hawaii, as to the time and date on which the test is to take place. Every contestant has expressed faith in the accomplishment of the project. "Why can't we be heard in Honolulu when they copy us in Alaska?" is the question asked by one of the contestants. "The distance to Honolulu is something like 2,100 miles—clear sailing, with no obstacles to encounter, such as mountainous regions, etc. It should be far easier to be heard in Honolulu than in Colorado," says another contestant.

Mr. Malcolm H. Finley has the following to say in regard to the test:

"The Hawaiian transmitting contest sure sounds like great dope, and, although I do not claim to have anything like the best station on the Coast, I have been doing some fairly good work and would certainly like to take a whack at the test. The closed circuit of my transmitter is about as efficient as any set in the state, but the weakness lies in the open circuit. My aerial is only fifty-five feet high at one end and twenty-five feet at the other. It is well insulated, especially at the outer end. Regardless of these handicaps, stations as far north as Vancouver, Washington, report hearing my signals with good audibility. Put me down on the list for the test and when the time comes, this bird will be on hand."

The most interesting factor of the test is the lack of interference that will be experienced by the listening-in station at Pearl Harbor. Mr. Mulrony will silence the arcs on the balmy isle in order to give us a fair chance to be heard. Among the entries received to date are the following:

D. B. McGown (6ZE), San Francisco.
Hall Berringer (6BJ), Burlingame, Cal.
A. E. Bessey (6BR), Sunnyvale, Cal.
H. R. Shaw (6BN), San Francisco.
Seefred Bros. (6EA), Los Angeles.
Malcolm H. Finley (6PQ), Santa Ana.
Garratt Arnold (6AT) San Jose, Cal.
Royal Mumford (7CU) Vancouver, Washington.

The Seefred Brothers have this to say:

"We note on page 51 of the current issue of "PRN" an article on the doubtfulness of Mr. T. C. Hall copying our station (6EA) in Honolulu. We would like to say that we believe that Mr. Hall is correct in his statement, as we have been heard in Juneau, Alaska, on a crystal detector and a Marconi type 101 tuner with Bladwin phones. We have also been heard by 9ME, Fort Wayne, Indiana, with the use of a Paragon RA6 tuner, single Audiotron and Brandes 2,000 ohm phones. Both stations mentioned are in the neighborhood of 2,000 miles from Los Angeles and our signals were copied with good audibility. With Mr. Hall's eight-stage amplifier he should not experience any difficulty in copying us. My brother (6EB) and myself are ready to participate in the test."

The contestants will be asked to comply with certain fixed rules in order to make the test one of fair play. The power input shall not exceed 500 watts and a wave length of 200 meters shall be used. Further details will be forwarded to the contestants by mail and the result of the contest will be announced in an early issue.

device depends on a well-known scientific principle, and it seems strange that it has not been used before.

In order to secure the greatest signal strength, no matter what type of receiving apparatus we employ, the circuits must be in resonance with the wave length of the transmitting station from which we desire to receive. This is brought about by varying the values of capacity, inductance, or both, in the receiving circuits until the point of resonance is found. The waves sent out from the station from which we are receiving are of constant length when the values of the transmitting circuits remain constant, and once the proper setting of the receiver is found no further manipulation is necessary. Waves of a given length will oscillate in the receiving circuits while waves of other lengths will be excluded. When two or three stations are working together in the same neighborhood, even though they are of different wave lengths, if their power is great enough they will force their way through the receiving apparatus either by forced oscillations, harmonics, or in some instances by re-radiation.

However, a well-designed receiving set coupled to a loop receiver will generally cut out this sort of interference. But let us consider several stations of approximately the same power, working on the same wave length and in comparatively short distances of one another. The result may quite well be compared to the parliamentary proceedings at the famous Tower of Babel.

This is just about where the thing has rested for a number of years. No thought seems to have been given to the fact that but few stations produce identical notes in the telephone receivers. The application of acoustics to radio has not, until recently, been given much attention.

Scientists tell us, and it is everywhere evident, from the pipe organ to the phonograph, that any sound has a natural period of vibration. Using a certain sized acoustic chamber as a unit in a pipe organ, it will produce a certain note. By simply reversing this principle we find that any given note will pass with the greatest intensity through an acoustic chamber of a size corresponding to its wave length.

Even though we find a great many stations which are supposed to be equipped with apparatus which will produce the same tone at the receiving end of the line, practice indicates that there is a great variation of tones. This may be the result of any of a number of causes which are brought about by local conditions. But the point is this: given a means for tuning to the acoustic wave

(Continued on page 103)

ACOUSTIC TUNING

The Latest Scientific Aid to Radio Communication

AVAST improvement in static signal ratio can be noted when a loop antenna of the proper design is used. Instead of conducting the static from all directions to the tuning apparatus, only such strays as those which have their origin in a plane parallel to the loop are received. There is therefore a great reduction of static, with but little reduction of signal strength, and the proportion is much improved.

Loop antennae and multi-stage amplifiers, both radio and audio, are here to stay, but even these devices do not entirely fill the need where the static is extremely heavy and the signals very weak.

A static eliminator, introduced by an Eastern company, is a very unique departure from the customary methods employed for killing the bane of radio operating. The operation of this new

S4038

A BILL

66TH CONGRESS
Introduced by MR. POINDEXTERTO REGULATE THE OPERATION OF AND FOSTER THE DEVELOPMENT
OF RADIO COMMUNICATION IN THE UNITED STATES.

READ TWICE AND REFERRED TO THE COMMITTEE ON NAVAL AFFAIRS.

BE it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the purpose of this Act is to regulate the operation of and to foster the development of radio communication in the United States so that the maritime and other commercial interests of the United States may receive the maximum benefits therefrom; and to provide additional facilities to be utilized by the United States in maintaining and improving the national security and defense.

That wherever used in this Act the term "radio communication" shall be construed to mean communication by an electrical system or method without the aid of conducting connections, or with the aid of wires or other conducting connections from which radio frequencies can be intercepted at a distance of one-half of one mile; the word "apparatus" to mean machines, devices, and all other equipment used in radio communication; the words "transmitter" and "receiver" to mean the sending and receiving apparatus, respectively, used in radio communication; the word "radiogram" to mean message, communication, or signal transmitted or received in radio communication; the term "radio station" to mean a place where apparatus is used for transmitting, receiving or for transmitting and receiving the signals used in radio communication; and the term "territory of the United States" or the word "territory" to mean any territory, district, zone, insular possession, water, or other place subject to the jurisdiction of the United States, and not within any State.

The word "person" as used in this Act shall be construed to import both the plural and the singular and to include corporation, co-partnership company, or association; and when construing and enforcing the provisions of this Act, the act, omission or failure of any director, officer, agent, or employee of such corporation, co-partnership company or association acting within the scope of his employment or office shall in every case be deemed the act, omission, or failure of such corporation, co-partnership, company, or association as well as that of the person so acting for or on behalf thereof.

Sec. 2. That radio stations are divided for the purposes of this Act into the following classes:

First. Coastal station, a radio station on land or on a permanently moored vessel used for the exchange of correspondence with ships at sea or aircraft. Coastal stations include (a) those open to general public correspondence and (b) those open to limited public correspondence. Coastal stations of class (b) transmit and receive private radiograms to and from certain stations only which are designated in the license.

Second. Ship station, a radio station on board any vessel or aircraft not permanently moored. Ship stations and aircraft include (a) those open to general public correspondence and (b) those open to limited correspondence. Ship and aircraft stations of class (b) transmit and receive private radiograms to and from certain stations only which are designated in the license.

Third. Land stations, namely, radio stations on land or on a permanently moored vessel used in the transmission or reception of private radiograms (1) between a point within the continental limits of the United States and any other point within such limits, (2) between a point within the limits of any Territory of the United States and any point within the limits of the same Territory, (3) between a point in the United States of a Territory of the United States and a point in another Territory of the United States distant one thousand miles or less. Land stations include (a) those open to general public correspondence, (b) those open to limited correspondence.

Fourth. Transoceanic stations, namely, radio stations on land used in the transmission or reception of public correspondence (1) between a point in the United States and a point in any foreign country; (2) between a point in the United States and a point in any territory of the United States distant more than one thousand miles from the first; (3) between a point in any Territory of the United States and a point in any other Territory of the United States

A NEW BILL PROPOSED BY SENATOR POINDEXTER THREATENS DANGER TO ALL BRANCHES OF THE RADIO ART

AT the last session of Congress Senator Poindexter introduced the Bill known as S4038 which appears herewith. This Bill, which, it is understood, is really proposed by the Navy Department, is one of the most dangerous of all Bills which have even been presented to Congress.

This Bill provides for a National Radio Commission appointed as described in detail in Section 4. The control of radio communication will be left to this Commission and here the first Joker appears:

THE SECRETARY OF THE NAVY SHALL APPOINT A NAVAL OFFICER WHO WILL ACT AS SECRETARY OF THE COMMISSION AND WILL, OF COURSE, BE ITS ADVISORY HEAD, BEING AN APPOINTEE OF THE SECRETARY OF THE NAVY THIS OFFICER, WHOSE VERY POSITION WILL DEPEND UPON THE PLEASURE OF THE SECRETARY, WILL HOLD THE NAVY AND THE NAVAL RADIO SERVICE AS SUPREME.

THE SECOND JOKER:

Section 7. No station shall be licensed if, by its operation, it might interfere with the operation of previously existing Government or licensed stations. The statement, "That it is not necessary for the general good of the public service," as provided in this section is vague and indefinite. This means that if one commercial company established a shore station to handle the ship-to-shore business at any port no other station can be established to handle this business.

THE THIRD JOKER:

Section 12. This section provides that a license shall be issued to any person who submits proper evidence under oath that said applicant possesses sufficient experience and skill to operate a station. No examination or other method of determining the qualifications of the candidate is provided for, and nothing is said in regard to the various grades of operators to be licensed. No restriction is placed on aliens as ship operators but none other than American citizens may operate other classes of stations.

THE FOURTH JOKER—AND A BAD ONE!

Section 18. No land station, amateur, experimental or training school, shall be located in such a manner as to interfere with coastal, trans-oceanic, or Government stations. This means that all amateurs in the vicinity of any of these classes of stations will be forced to discontinue transmitting because they MIGHT interfere with the above mentioned stations.

WRITE TO YOUR CONGRESSMAN AND PROTEST THE PASSAGE OF THIS BILL. IF THIS BILL BECOMES A LAW IT WILL MEAN THE DEATH OF AMATEUR RADIO

distant more than one thousand miles from the first.

Fifth. Experiment station, a private radio station on land, ship, or aircraft actually engaged in conducting experiments for the development of the science of radio communication of the apparatus pertaining thereto.

Sixth. Technical and training school station, a private radio station on land, ship, or aircraft used for purposes of instruction in radio communication and training operators.

Seventh. Amateur station, a private radio station on land not covered by third, fourth, fifth, sixth, or eighth paragraphs of this section and not operated for financial profit. Amateur stations include (1) general amateur stations; (2) restricted amateur stations which are within five nautical miles of a Government station; (3) special amateur stations, the operation of which seems likely to result in some substantial benefit to radio communication.

Eighth. Government station, any radio station controlled and operated by any department of the Government. They are not open for general public correspondence except as specified in the provisions of this Act. They do not require licenses, but shall be subject to the jurisdiction of the National Radio Commission hereafter mentioned, so far as concerns wave lengths and other matters affecting interference.

Sec. 3. That nothing in this Act shall be construed to apply to the transmission, reception, or exchange of radiograms or signals between points in the same State if said transmission, reception, or exchange shall not interfere with the reception of radiograms or signals from beyond the jurisdiction of the said State, or if the effect thereof shall not extend beyond said jurisdiction.

Sec. 4. That, for the purpose of regulating radio communication in the United States and its Territories there is hereby created a permanent National Radio Commission composed of four members properly qualified, one to be appointed by the Secretary of the Navy, one by the Secretary of War, one by the Secretary of Commerce, and one by the Postmaster General. There shall be a secretary of the commission, who shall be an officer of the active list of the line in the United States Navy, to be designated for this service by the Secretary of the Navy. The members of the commission shall receive a salary of \$4,000 per annum each, and officials of the departments named in this section may be detailed for service on the commission by the heads of the departments, respectively, and each member shall be subject to removal or transfer by the head of the department from which he was appointed.

This commission shall be designated as the National Radio Commission, and as such shall have full power to regulate radio communication in the United States and its Territories in accordance with the provisions of this Act and in accordance with such international radio communication conventions as may be ratified or adhered to by the United States.

The National Radio Commission shall publish regulations concerning methods of operating, procedure, wave lengths, radio interference, and power used by the various classes of licensed radio stations. These regulations shall be based, in so far as is practicable, upon the regulations of international radiotelegraph conventions, shall be of such a nature as to afford protection to the various services involved and shall conform invariably to the technical developments of radio communication.

The National Radio Commission shall assign bands of wave lengths for the use of each of the classes of licensed stations described in section 2 of this Act; such bands shall correspond in so far as is practical, to those prescribed by present or future international radio conventions ratified by the United States.

The National Radio Commission shall grant licenses for radio stations and operators in accordance with the provisions of this Act, assigning to each separate station, so far as is possible, a wave length or wave lengths such as to enable it to accomplish the purpose for which the license is issued, with due regard to the rights of duly licensed stations.

The National Radio Commission shall enforce its regulations and the provisions of this Act, through the Department of Commerce and through collectors of customs and such other officers as the Secretary of Commerce may designate; and the National Radio Commission shall in the same manner enforce the provisions of such international radio conventions as have been or may hereafter be ratified or adhered to by the United States, except that provisions there-

of relating to Government radio installations shall be enforced by the departments controlling such installation.

The National Radio Commission shall advise and assist citizens, firms, or corporations of the United States in the establishment of radio communication facilities with foreign countries and shall represent the Government and citizens, firms, or corporations of the United States in matters pertaining to international regulations of radio communication. The National Radio Commission is authorized to appoint representatives at international conferences in which subjects pertaining to radio or other methods of communication as to be discussed.

The National Radio Commission is authorized to correspond with any international radio commission or bureau which has been or which will be constituted, and to correspond with any foreign national radio commission or department charged with the administration or regulation of radio communication in a foreign country: Provided, That such correspondence shall be conducted through and by and with the advice and approval of the State Department or in accordance with the provisions of present or future international radio or communication conventions.

The National Radio Commission is authorized to advise and assist citizens of the United States or corporations, co-partnerships, companies, or associations licensed in the United States to operate transoceanic radio stations between the United States and a foreign country or countries in matters pertaining to transoceanic radio communications: Provided, That no such advice or assistance on the part of the National Radio Commission shall constitute an obligation on the part of the Government of the United States to support financially or politically any action taken by such person or licensee, and that no such advice or assistance on the part of the National Radio Commission shall operate to modify or change the action taken by the Interstate Commerce Commission, or other authorized Government agency, in the exercise of its legal powers.

Whenever application is made for the grant of a license for a radio station, the operation of which may interfere with the operation of then existing Government or licensed stations, notice of such application shall be given forthwith by the National Radio Commission to the department of the Government or licensee operating such existing station, and an opportunity shall be afforded such interested party to be heard and to submit evidence before the National Radio Commission in opposition to the granting of such license.

The National Radio Commission is hereby authorized to mitigate or remit any fine, penalty, or forfeiture (other than penalty of imprisonment) incurred under the provisions of section 5, section 8, section 11, section 12, section 13, section 15, and section 28 hereof, in the manner prescribed by law for the mitigation or remission of penalties for violation of the navigation laws.

Sec. 5. That no radio station other than those belonging to or operated by the United States shall be used by any person within the jurisdiction of the United States to transmit or receive any radiogram by the apparatus and methods of radio communication except under and in accordance with a station license or licenses, issued by the National Radio Commission. In case of stations not actually under construction or already constructed at the date of the passage of this Act, the license or licenses must be secured before the commencement of the construction of such stations. Any person who shall operate any radio station in violation of this section shall be punished by a fine not exceeding \$500 for the first offense, and by a fine not exceeding \$1,000 or imprisonment for not more than one year or both, for each offense thereafter; and any radio apparatus operated in violation of this section shall be subject to forfeiture: Provided, That licenses for amateur radio stations shall be issued without cost to the licensees.

Sec. 6. That the station license required by section 5 hereof shall not be granted to, nor shall the station so licensed be managed, operated, owned, or controlled by or transferred to or to the management, operation or control of, any alien or aliens or representatives thereof, nor any foreign Government or representatives thereof, nor any company, corporation, or association organized under the laws of any foreign Government; nor any company, corporation, or association of which any officer or any director is an alien, or of which more than one-fifth of the voting capital stock is owned or controlled by aliens or their represen-

tatives, or by a foreign Government or representative thereof, or by any company, corporation, or association organized under the laws of a foreign country; nor to any company, corporation or association which is dominated or controlled by alien interests; and a license may be declared void by the National Radio Commission, on violation thereof: Provided, That reasonable opportunity shall be accorded to a licensee to make arrangements satisfactory to the National Radio Commission, if such violation arise through no fault of such licensee. And the National Radio Commission is given discretionary power in such cases to declare void or to continue a license absolutely or on terms, after a full examination of the circumstances attending any investments in or a transfer of stock in violation of this section: Provided further, That if the charter or by-laws of the corporation in question shall provide that all officers and directors thereof shall be American citizens and that a representative of the Secretary of the Navy, who shall be an officer of the line of the Navy or of above the rank of captain, may attend and be heard at meetings of its stockholders and of its directors, and if such charter shall further provide that certificates for not more than one-fifth of the total shares of the corporation at any time outstanding may be issued in special form, which may be owned or held and voted by foreigners without restrictions, to be called foreign shares, and that no other share of such corporation may be voted, which such share is owned or the voting right therein is controlled, directly or indirectly by an alien, and that at any annual or other meeting of the corporation the representative of the Secretary of the Navy may, by notice in writing filed at the meeting, challenge any vote on the grounds aforesaid, and if the challenged votes affect the result, the directors shall investigate the challenge, adjourn the meeting, separately record the votes and investigate the charge, and if they find such challenge well founded shall, in counting the votes, disregard the votes so challenged.

Sec. 7. That except in the case of experiments in the development of the art, a license shall not be granted to any station not in actual process of construction or already constructed at the date of the passage of this Act, if the operation of the proposed station will seriously interfere with the operation of existing Government or licensed stations or is not necessary for the good of the general public service.

Sec. 8. That the station license prescribed by section 5 hereof shall be issued or amended only in response to a written application therefor, addressed to the National Radio Commission, which shall set forth the following facts:

First. (a) If the applicant be a natural person, his name and address, the date and place of his birth, and, if naturalized, the date and place of his naturalization.

(b) If the applicant be a partnership or association of natural persons, the foregoing data regarding each member thereof.

(c) If the applicant be a corporation, the date of incorporation and under what laws incorporated, the principal place of business of the corporation, the names and addresses of the officers and directors, a statement as to each officer, specifying his place of birth and the country of which he is a citizen, and, if a naturalized citizen of the United States, the date and place of naturalization, and a statement showing what proportion of the capital stock is owned or controlled by aliens or their representatives thereof, and by companies, corporations, or associations organized under the laws of any foreign country.

Second. The ownership of the station and apparatus.

Third. The exact location of the station.

Fourth. The station with which it is proposed to communicate.

Fifth. The purpose or purposes for which the station is to be used.

Sixth. The wave length or wave lengths which it is desired to use at the station and the period or periods of the day during which it is proposed to operate the station.

Seventh. Such further information as the National Radio Commission may by regulation prescribe.

Eighth. The application shall state the earliest and latest date of completion of construction and the earliest and latest date operation shall begin. Evidence satisfactory to the National Radio Commission of financial, technical, and other ability of the applicant to construct station as proposed shall be stated in the application.

Every application shall be signed by the applicant upon oath or affirmation. If the applicant is a corporation, the application shall be signed upon oath or affirmation of a duly authorized officer thereof.

Whoever shall knowingly make any untrue statement in the application for a license prescribed by this section shall be guilty of perjury, and shall be punished by a fine not exceeding \$2,000, or by imprisonment for not more than five years, or both.

Sec. 9. That station licenses shall be in such form as the National Radio Commission shall prescribe, and shall contain a statement of the following conditions, to which such licenses shall be subject:

First. The station shall be at all times subject to inspection by officials of the Department of Commerce and the National Radio Commission.

Second. The ownership or management of the station or apparatus shall not be transferred in violation of section 6 of this Act.

Third. Such books and records of the licensee as contain entries showing whether or not the provisions of this Act are being observed shall be open at all times to inspection by officials of the Department of Commerce or the National Radio Commission to enable them to determine whether such violation or failure to observe has occurred.

Fourth. Apparatus other than that specified in the license shall not be used for radio communication, except in case of emergency or for experimental work authorized by the National Radio Commission.

Fifth. Such license shall show specifically the ownership and location of the station in which the apparatus is to be used and such other particulars as the National Radio Commission may deem necessary for the identification of the apparatus and to enable its range to be estimated, shall show the purpose of the station, the wave length or wave lengths and the decrement or decrements authorized for use by the stations, and the hours for which the station is licensed to work.

Sixth. Such licenses shall also show specifically the earliest and latest date operation shall begin and shall indicate that the license will be automatically forfeited if the station is not operated by time set, unless the license is renewed by the National Radio Commission.

Sec. 10. That any station license shall be revocable by the National Radio Commission for continued failure to operate service contemplated, or for violation of or failure to observe any of the restrictions and conditions mentioned in the preceding section or other provisions of this Act or regulation of the National Radio Commission, and such books and records of the licensee as contain entries showing whether or not the provisions of this Act are being observed shall be open at all times to inspection by officials of the Department of Commerce or the National Radio Commission to enable them to determine whether such violation or failure to observe has occurred: Provided, That before a license is revoked, the licensee shall be afforded opportunity to present evidence in his behalf to the National Radio Commission; and that upon revocation of a license the National Radio Commission shall issue a statement giving the reasons for such revocation.

Sec. 11. That the actual operation of every radio station for which a station is required by this Act shall be carried on by a person to whom an operator's license shall have been issued hereunder. No person shall operate any such station except under and in accordance with an operator's license issued him by the National Radio Commission. The National Radio Commission, in its discretion, may grant special temporary licenses to operators of radio apparatus when an emergency arises requiring prompt employment of such an operator. Whoever shall employ any unlicensed person in the operation of any licensed radio station, or whoever without an operator's license shall operate such a station, shall be punished by a fine not exceeding \$100 for the first offense and by a fine not exceeding \$200 or imprisonment for not more than two years, or both, for each offense thereafter: Provided, That this section shall not apply to the use of radiotelephone stations regularly licensed for public service.

Sec. 12. That an operator's license shall be issued only in response to a written application therefor addressed to the National Radio Commission, which shall set forth the name, age, and address of the applicant,

date, and place of birth, the country of which he is a citizen; and if a naturalized citizen of the United States, the date and place of naturalization. The application shall also state the previous experience of applicant in operating radio apparatus and such further facts or information as may be required by the National Radio Commission. Every application shall be signed by the applicant upon oath or affirmation. An operator's license shall be issued only to a person who, in the judgment of the National Radio Commission, is shown to be proficient in the use and operation of radio apparatus and in the transmission and receipt of radiograms. Except for the operation of a station on shipboard, an operator's license shall not be granted to any alien, nor shall such a license be granted to a representative of a foreign Government for the operation of any radio station. Whoever shall knowingly make any untrue statement in an application for an operator's license shall be guilty of perjury and shall be punished by a fine not exceeding \$2,000 or by imprisonment for not more than five years, or both.

Sec. 13. That an operator's license shall be in such form as the National Radio Commission shall prescribe, and may be suspended by the National Radio Commission for a period not exceeding two years, upon proof sufficient to satisfy the commission that the licensee has violated any provision of this Act or regulation of the National Radio Commission, or that he has failed to compel compliance therewith by an unlicensed person under his supervision, or that he has been willfully negligent or has failed in carrying out the lawful orders of the master of the vessel on which he is employed, or that he has willfully damaged or permitted apparatus to be damaged. The license may be revoked by the National Radio Commission upon proof sufficient to satisfy the commission that the licensee was or is ineligible for a license.

Sec. 14. That during any war in which the United States shall be a neutral nation, the President may establish such control over the operation of radio stations within the jurisdiction of the United States, as may be necessary to prevent violation of the international obligations of the United States, and in time of threatened or actual war in which the United States may be a party, and in time of public peril or disaster, the President may cause the temporary closing of any radio station within the jurisdiction of the United States and the temporary removal therefrom of any radio apparatus for the period of the emergency, or may authorize the temporary removal of any radio apparatus for the period of the emergency, or may authorize the temporary use of the station or the apparatus by any department of the Government for a like period or periods. In case of any action under this section, just compensation shall be paid to the owners.

Sec. 15. (a) That whoever shall maliciously or willfully interfere with or cause any interference with radio communication carried on or sought to be carried on by any duly licensed or Government radio station or apparatus shall be punished by a fine not exceeding \$500 for the first offense, and by a fine not exceeding \$1,000 for each offense thereafter.

(b) That whoever shall receive or assist in receiving with intent to divulge or publish the contents, substance, purport, effect, or meaning of any radiogram or any part thereof to any person other than the addressee thereof, his agent or attorney, except to a telegraph or radio station employed to forward such radiogram to its destination, or to proper accounting or distributing officers of the various communicating centers over which the radiogram may be passed, or to the master of a ship under which he is serving or in response to a subpoena issued by a court of competent jurisdiction, or on demand of other competent authority, and whoever shall receive or assist in receiving any radiogram with the intent to use the same or any information therein contained for his own benefit or for the benefit of another without authority and whoever, having received such radiogram or become acquainted with the contents, substance, purport, effect, or meaning of the same or any part thereof shall so willfully and without authority divulge or publish the contents, substance, purport, effect, or meaning of the same or any part thereof, or use the same or any information therein contained for his own benefit or for the benefit of another without authority, shall be punished by a fine not exceeding \$500 for the first offense,

and by a fine not exceeding \$1,000 or one year's imprisonment, or both, for each offense thereafter: Provided, That this section shall not apply to the divulging or utilizing of the contents of any radiogram by the sender or his agent or his attorney, or to the receiving, divulging, publishing, or utilizing of the contents of any radiogram intended for the use of the general public.

Sec. 16. That no person owning, controlling, or operating licensed radio station or stations shall form a partnership, combination, or association with any person owning, controlling, or operating submarine cables or land telegraph or telephone systems in or touching the United States or its Territories in such a way as to limit competition in the transmission of intelligence from and to the United States.

Nothing herein contained shall prevent co-operative agreements made with the consent of the National Radio Commission which without undue restraint of competition, tend to further and improve the radio service.

Sec. 17. That all ship and coastal stations shall give priority over all other radiograms to radiograms relating to ships in distress, and except when answering or aiding a ship in distress, shall refrain from sending until all radiograms relating to the ship or ships in distress shall have been completed.

Sec. 18. That no land stations, amateur stations, experiment stations, or technical and training-school stations shall be located in such a manner as to interfere with coastal, transoceanic, or Government stations.

Sec. 19. That the National Radio Commission may in its discretion, grant special temporary licenses to stations to permit the carrying on of tests with any amount of power or any wave lengths at such hours and under such conditions as will insure the least interference with the work of other stations.

Sec. 20. That land, amateur, experiment, and technical and training-school stations, shall not use transmitting wave lengths except as prescribed by the National Radio Commission.

Sec. 21. That every coastal station and ship station shall at all times be ready to send and receive messages and signals on such wave lengths and of such wave character as are required by the existing or future international conventions.

Sec. 22. That coastal, transoceanic, and ship radio stations shall adhere to the rules regarding wave lengths and power prescribed by the National Radio Commission.

The National Radio Commission may regulate the use of or prohibit the use of transmitters of stations on shipboard in harbors within the jurisdiction of the United States, as it may deem necessary.

Sec. 23. That whoever, including any person in the service of the Government shall knowingly transmit or publish, or knowingly cause to be transmitted or published, any false or fraudulent distress radiogram, or who, when engaged in radio communication, shall transmit or publish, or cause to be transmitted or published, any other radiogram for the purpose of defrauding or deceiving the Government, shall be punished by a fine not exceeding \$2,000, or imprisonment for not more than five years, or both.

Sec. 24. That no person shall use or operate any radio apparatus on a foreign ship when within the jurisdiction of the United States otherwise than in accordance with the provision of sections 14, 15, 17, 21, and 22 of this Act, and all provisions of said sections and penalties thereto attaching are hereby made applicable to such apparatus: Provided, however, That in no other respect shall anything in this Act apply to public vessels of foreign governments otherwise than by a general proclamation of the President.

Sec. 25. That the office of Director Naval Communications, established under the jurisdiction of the Navy Department, shall be charged with the accounting and payment of charges in connection with the settlement of international radio accounts of ship-to-shore traffic, as provided by the London Radiotelegraphic Convention of 1912, or as may be provided by future international conventions. The expenses involved in the settling of international radio accounts, not exceeding \$7,000 per annum, shall be borne by the United States.

Sec. 26. That in all cases of violation of any provision of this Act or of any regulation of the National Radio Commission for which no penalty is otherwise prescribed, a

penalty of \$100 upon the owner of the apparatus by means of which such violation was effected, or a penalty of \$25 upon the offending operator, or both, to be imposed by the commission, is hereby prescribed, but such penalties may be reduced or remitted by the National Radio Commission, in its discretion; and, in addition, the National Radio Commission, in its discretion, may revoke the station license of such owner and revoke or suspend the license of such operator, as provided in sections 10 and 13 of this Act.

Sec. 27. That, except as otherwise specifically provided in this Act, the provisions of this Act shall extend to all places subject to the jurisdiction of the United States. The several courts of first instance in the Philippine Islands and the district court of the Panama Canal Zone shall have jurisdiction of offenses as defined by this Act committed within their respective districts, and of conspiracies to commit such offenses, as defined by section 37 of the Act to codify, revise, and amend the penal laws of the United States, approved March 4, 1919, and the provisions of said section, for the purposes of this Act, are hereby extended to the Philippine Islands and to the Panama Canal Zone.

Sec. 28. That orders of the National Radio Commission granting or denying applications for licenses for radio stations or radio operators, or revoking, suspending, modifying, or declaring void any licenses for such stations or operators previously granted, or imposing penalties for alleged violations of the provisions of this Act, may be reviewed on petition by any of the parties affected thereby to the Court of Appeals of the District of Columbia. Such petition shall be filed within thirty days from the date of the order of the National Radio Commission sought to be reviewed and a copy thereof shall forthwith be served upon the National Radio Commission. The National Radio Commission shall forthwith answer said petition setting forth the grounds upon which its order was based and shall file in the said court a transcript of the proceedings had before it; and thereupon the said court shall proceed expeditiously to hear and determine said petition and to affirm, set aside, or modify the order of the National Radio Commission, and the order of said court shall be final. The said court shall have power by appropriate orders to regulate all matters of practice in connection with the review of such cases.

Sec. 29. That the Act approved August 13, 1912, entitled "An Act to regulate radio communication," is hereby repealed. Such repeal, however, shall not affect any act done or any right accruing or accrued, or any suit or proceeding had or commenced in any civil cause prior to said repeal, but all penalties, forfeitures, or liabilities incurred prior to taking effect hereof under any law shall continue and may be prosecuted and punished in the same manner and with the same effect as if this Act had not been passed.

DOINGS OF THE S. F. RADIO CLUB

WE are thinking of nothing but the Convention and your co-operation to make it a booming success. Have you seen the advertisement of the San Francisco Radio Club regarding the Convention? It tells the story from beginning to end. The reception committee must know in advance how many radio men will attend and for this reason it is asked that the blank be mailed promptly. Up to the time that we go to press about 200 names are on the list. Let's try to swell that list to busting proportions. SIGN THAT BLANK and let those unscrupulous and inconsiderate few in Washington know that we are alive.

The fair sex are by no means barred from the Convention. We hope that they will be there in all their glory and charm. If they will let us hear from them we can arrange to have a chaperon for each 'n every one. How's that? SIGN THE BLANK!

A NEW DECREMETER

THE measurement of the Logarithmic Decrement has always been the greatest obstacle in the way of proper tuning of the Amateur Radio Transmitter. The delicacy of the hot-wire, current-squared meter used in the construction of decremeters, with its high cost, have placed the instrument entirely beyond the reach of the Amateur Station Owner.

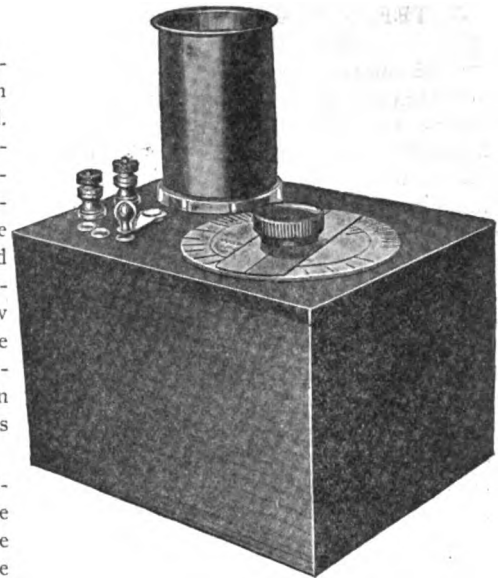
A Decrometer has been developed which does not require a hot-wire meter, is accurate and rugged, and is perfectly adapted to Amateur needs. This instrument will measure both the logarithmic decrement and wave length. It is provided with two small incandescent electric light bulbs which are mounted at the bottom of a cylindrical tube, the upper end of which is closed by a frosted screen. One of these bulbs is lighted by the current induced in the oscillatory circuit of the Decrometer and the other is lighted by two dry cells. A tubular shield is provided through which the screen can be viewed.

The operation of the instrument is as follows: The Decrometer is first adjusted to perfect resonance with the antenna circuit as indicated by maximum illumination of the oscillatory circuit bulb. The coupling between the Decre-

meter and the Transmitter is then varied until the illumination produced on the screen by the two bulbs is equal. A resistance is now into the battery circuit by throwing a switch, which reduces the current by a suitable pre-determined fraction, and thereby reduces the illumination on the screen associated with the battery circuit bulb. The variable condenser of the Decrometer is now rotated, first on one side of resonance and then on the other, until the illumination on the two halves of the screen is again equal, and the scale reading is taken in each position.

The difference between the two readings is the sum of the decrement of the circuit under measurement and that of the Decrometer itself. The decrement of the Decrometer is subtracted to obtain the final result. No complicated calculations of any kind are necessary. The measurement of the logarithmic decrement has thus been reduced to its simplest possible terms, the total time required for making a measurement not exceeding one minute.

The United States laws governing Radio Communication state that the logarithmic decrement shall not exceed two-tenths. Under these conditions it is actually possible to radiate more energy



which is effective in transmitting, than with a broad wave of high decrement. A hot-wire ammeter in the antenna does not give a good indication of the effectiveness of a radio transmitter, because it does not distinguish between the condition where the energy is spread over a broad band of wave lengths and the condition where it is concentrated in a narrow band.

*Photograph courtesy of F. M. Doolittle Co.

INTERNATIONAL RADIO TO BUILD STATION HERE

ANOTHER wireless transmission concern, the International Radio and Telegraph Company of New York, is preparing to erect a station and do business in San Francisco, according to advices received by Major J. F. Dillon, radio inspector for the bureau of navigation, Department of Commerce. There are now four radio companies doing business in San Francisco, the Federal Wireless, the Marconi, the Ship Owners' and the Independent. The three former have divided the 1,200 vessels of the Shipping Board equally among them.

"I have had remarkable success with one of the B. S. Tuners," says Chief Electrician E. S. Pyle, U. S. N. Radio Station, Ketchikan, Alaska. He refers to the instrument manufactured by the Tresco Company and states that he hears the East Coast arcs on an aerial 70 feet long and 30 feet high. NPN has been heard on the same aerial—a distance of almost 6,000 miles. A Western Electric VT1 tube was used.

Turn your spare time into dollars by securing subscriptions to "Pacific Radio News." Any ambitious amateur can handle our new proposition. It will interest you. Write for details.

SIXTH DISTRICT AMATEUR STATIONS—Continued.

6ACT	C. A. Thunen...	5766 Broadway...	Oakland, Cal.
6ACU	"Y" Radio Club...	110 Cabrillo St...	Santa Barbara, Cal.
6ACV	R. Walker...	1127 El Centro Ave...	Alameda, Cal.
6ACW	C. Potter...	117 Hillside St...	Piedmont, Cal.
6ACX	R. H. Owen...	6811 Hollywood Blvd...	Los Angeles, Cal.
6ACY	A. E. Ekdale...	115 N. Chester Ave...	Los Angeles, Cal.
6ACZ	D. deNeuf...	811 B St...	Petaluma, Cal.
6ADA	M. Madero...	436 10th St...	San Diego, Cal.
6ADB	A. Cook...	3016 Brook St...	Oakland, Cal.
6ADC	A. B. Curtis...	2060 Marengo Ave...	Los Angeles, Cal.
6ADD	A. Merrill...	214 Highland Ave...	Piedmont, Cal.
6ADE	E. B. Weise...	1355 Regent St...	Alameda, Cal.
6ADF	R. D. McCurdy...	1602 Pine Ave...	Long Beach, Cal.
6ADG	F. Noel...	301 W. Avenue 43...	Los Angeles, Cal.
6ADH	P. Freidenthal...	2249 Broderick St...	San Francisco, Cal.
6ADI	J. W. Summers...	1061 62d St...	Oakland, Cal.
6ADJ	H. T. McRae...	643 N. Kenwood St...	Glendale, Cal.
6ADK	M. D. Jergins...	1037 Elden Ave...	Los Angeles, Cal.
6ADL	J. S. Campbell...	873 N. Chester Ave...	Pasadena, Cal.
6ADM	H. J. Bolton...	124 N. Dillon St...	Los Angeles, Cal.
6ADN	W. Van Ziles...	1113 Evelyn Place...	Pasadena, Cal.
6ADO	J. H. Neilsen...	4003 1st St...	San Diego, Cal.
6ADP	R. P. Coulter...	69 S. 10th St...	San Jose, Cal.
6ADQ	W. R. Pressel...	136 Mill St...	Reno, Nevada.
6ADR	R. N. Bell...	1835 Edgemont Ave...	San Diego, Cal.
6ADS	C. De Vinna...	1004 2d St...	Santa Monica, Cal.
6ADT	L. P. Smith...	729 W. 5th St...	Reno, Nevada.
6ADU	L. B. Benjamin...	140 S. Oxford St...	Los Angeles, Cal.
6ADV	R. W. Hichman...	440 N. Washington St...	Whittier, Cal.

SPECIAL AMATEUR CALLS FOR THE SIXTH DISTRICT ISSUED TO DATE

6ZA	Ira J. Kaar...	243 E. 7th St...	Salt Lake City, Utah
6ZB	Dr. A. E. Banks...	1648 Neale St...	San Diego, Cal.
6ZC	Dr. J. B. Ellis...		Cochise, Arizona
6ZE	D. B. McGown...	1247 47th Ave...	San Francisco
6ZG	F. W. VanWhy...	2012 N. Broadway...	Los Angeles
6ZH	W. C. Thompson...		Richfield, Utah
6ZJ	A. L. Munzig...	1017 Tribune St...	Redlands, Cal.
6ZK	A. E. Bessey...		Sunnyvale, Cal.
6ZL	A. N. Marquie...	649 1st Ave...	Yuma, Arizona

MONTEREY RADIO ASSOCIATION ENTERTAINS

THE members of the Monterey Radio Association were hosts at a seven course banquet given at the Sherman Rose Tea Garden, Wednesday evening, September 29th, to fellow radio enthusiasts within a radius of twenty-five miles from Monterey.

The visitors were met at the club rooms of the Monterey Radio Association and were given a demonstration of the operation of the remote control system that is used to operate 6DI.

The opening address was one of welcome, delivered by Mr. H. A. Greene, President of the club. Mr. Herbert Hand acted as toastmaster and several clever speeches were delivered. Mr. Earl Harris, President of the Santa Cruz Radio Association, spoke on radio conditions

between Santa Cruz and Los Angeles; Professor ellog of the Monterey High School, spoke of the services of the amateur radio man during the war; Mr. Hand spoke on water power conservation and Mr. Greene boosted the improvement of the amateur radio game with an interesting address.

The visitors were then taken to the various amateur stations in Monterey and several interesting equipments were examined.

"Honolulu comes in fine on my new V. T. socket," said Mr. E. S. Petersen at the radio club the other night.

Gee whizzzzz, young fellow, if you take another look at that socket you will discover that you have a vacuum tube peeking out through the top of it.

RADIO PHONES TO BE USED FOR TARGET PRACTICE

DIRECTED by wireless telephones from a squadron of airplanes and captive balloons, the coast defense artillery will begin target practice, the magnitude of which never before has been attempted on this coast. Another spectacular feature of the target practice will be a machine gun target shoot at an altitude of two miles and several miles at sea by members of the Ninety-first Aerial Squadron.

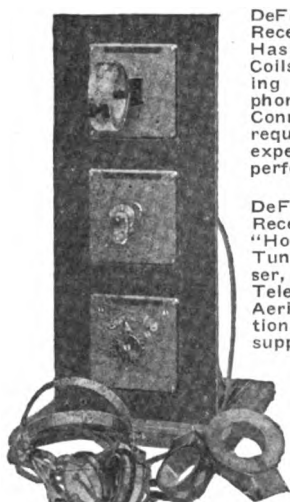
Army officers from the Coast Defense and the Army Air Service today are perfecting plans for maneuvers which give promise of being one of the most spectacular events ever seen in this vicinity. Crews of aviation mechanics are getting ships in the Ninety-first Squadron in readiness for the practice, which will continue throughout the greater part of October. At the same time, enlisted personnel in the Coast Defense and Coast Artillery are getting the guns ready for the big shoot.

Phone to Direct Fire

One of the unique features of the unusual form of target practice is the firing directed from planes in the squadron, which are being rigged up with wireless telephone, and in addition each ship will have two sets of radios.

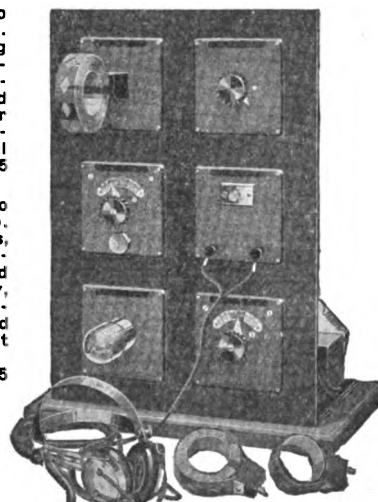
Flying at an altitude of more than two miles, members of the squadron, talking through the wireless telephones, which will be in communication with tugs towing the moving targets and the forts in action, will direct the line of fire.—S. F. "Call."

The Somerville Radio Laboratory, 102 Heath Street, Somerville, Mass., has recently perfected the "Nucleus", which is a bakelite panel and a number of parts for radio telephone sets. These various instruments can be connected together and used for speech transmission purposes.



DeForest Simplified Radio Receiving Station (3 Panel). Has "Honey-Comb" Tuning Coils, Crystal Detector, Tuning Condenser, Head Telephones, Aerial and Ground Connections and all other required supplies. An inexpensive set of wonderful performance. Complete \$47.35

DeForest Audion-Unit Radio Receiving Station (6 Panel). "Honey-Comb" Tuning Coils, Tuning and Grid Condenser, Audion Detector, Head Telephones, "B" Battery, Aerial and Ground Connections, and all other needed supplies. A very efficient set of wide range. Complete\$76.15



DeForest Audio-Unit Radio Receiving Station

DeForest Simplified Radio Receiving Station

Complete Unit-System Receiving Sets for Amateurs

THESE complete Radio Receiving Stations offer the most satisfactory method of securing reliable efficient, and scientific apparatus for absolutely dependable quality. They include everything required to set up and operate a Receiving Station that will operate satisfactorily and allow for expansion as the owner desires; including Aerial and Ground connections, Panels, Base and Back Boards, Unit Panels, all screws, wiring, insulators, etc.

Both Sets are part of the famous DeForest Unit-System and additional panels to increase the range and selectivity of the sets may be added at any time. For the beginner, or even the experienced amateur these sets are the most logical system. They do away with costly cabinets and more costly factory assemble, thus saving money for the purchaser. They are also more instructive as by wiring the panels the Amateur secures practical information.

SEND FOR CATALOGUE

DeForest Radio Apparatus should be on every Amateur's Christmas list. Send for our latest catalogue giving full, detailed descriptions of DeForest Receiving Apparatus. Sent postpaid for 10 cents.

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We also have a stock of reliable Radio equipment on hand including the apparatus manufactured by the Radio Development Co., and Pacific Radio Exchange.

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FINANCIAL NEWS

TO HANDLE its growing business, the Federal Telegraph Company has decided to issue \$500,000 general mortgage, serial, short term, 8 per cent gold notes, according to a circular letter to the stockholders, sent out by R. P. Schwerin, president. This note issue will mature in annual sums of \$100,000 in every year from 1923 to 1927, both inclusive.

The object sought to be obtained by this new financing, as explained in the circular letter, is the construction of two fully equipped wireless stations, one near Mountain View, California, and the other at Portland, Oregon.

This new financing will also assure the company obtaining the control and operation of a wireless station for the purpose of providing a ship-to-shore radio business, and it is also intended out of the proceeds of the notes to buy the patent rights of certain radio equipment.

It will be recalled that the company's wireless stations were sold to the United States government in 1918 and ever since the company has been compelled to transmit its telegraph messages upon leased lines, secured from the Pacific Telephone and Telegraph Company, at a yearly rent of \$81,303.

In January this year, President Schwerin says, the telephone company endeavored to cancel its lease on a part of the service, and had it been successful the Federal Telegraph Company would have had to shut down and discontinue a very lucrative branch of its business.

The Federal Company secured an injunction restraining the telephone company from discontinuing these leased lines for the present, but it was specified that a wireless station must be constructed by the Federal Telegraph Company to provide the necessary facilities for carrying on its business and the Federal Company stipulated that it would have this wireless station in operation by January 1, 1921; hence the necessity for these notes.

The company's business has grown materially since it came under the management of R. P. Schwerin and his associates, and that the company now has in its treasury, in cash, \$150,000.—S. F. "Call."

WOULD SELL WIRELESS

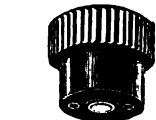
AN action in libel was filed by U. S. Attorney O'Connor yesterday in the United States District Court, praying for the sale of a wireless apparatus captured by the Federal officers at Mexicali, and intended, it is supposed, to be carried into Mexico.

The outfit consists of one DeForest two-step audion amplifier, one DeForest large coupler coil, one horn and two Marconi audion vacuum tubes. It is charged that the parts of the wireless

outfit were to be taken into Mexico in defiance of the proclamation of President Wilson.—Los Angeles "Times."

NEW RADIO COMPANY FORMED

MR. John B. McGinnis announces the formation of the Radio, Research and Supply Company, 88 Johnson St., Lynn, Mass. The new company will cater solely to the wants and needs of the amateur. John B. McGinnis, Ds., Sc., A. M. is President. Ray Corliss, M. S., is Consulting Engineer and Mr. Clyde Gould, M. S., is Secretary.



"Insulate" Handles, Knobs and

OTHER INSULATION ACCESSORIES

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If you could see the enormous quantity of wire, and the thousands of bakelite panels in the stock room of the G-A Company, you would feel insured against delays in the shipment of your orders.

G. A. STANDARDIZED HIGH FREQUENCY CABLE

All receiving inductances for wave lengths up to 3,000 meters and vacuum tube transmitters should be wound with high frequency cable if maximum signal intensity and sharpest tuning is desired.

10—No. 38 50 turns per inch **\$0.60** 20—No. 38 38 turns per inch **\$0.95** 3x16 No. 38 20 turns per inch **\$2**

Prices are per 100 feet. The finest enamel wire is used, covered with two wrappings of unbleached Italian silk threads.

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Sizes for everything from detector bases to complete sets. Every panel smoothly and squarely cut to an accuracy of 1/32 inch.

Thick	2 1/2 x 5 Ins.	5 x 5 Ins.	5 x 10 Ins.	10 x 10 Ins.	10 x 15 Ins.
1/8 In.	\$0.30	\$0.60	\$1.18	\$2.35	\$3.50
	2 oz.	4 oz.	8 oz.	1 lb.	2 lbs.
3/16	\$0.44	\$0.88	\$1.76	\$3.50	\$5.25
	3 oz.	6 oz.	12 oz.	1 1/2 lbs.	3 lbs.
1/4 In.	\$0.58	\$1.16	\$2.30	\$4.60	\$6.85
	4 oz.	8 oz.	1 lb.	2 lbs.	4 lbs.

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Stocks	Bid	Ask
National Radio	21c
Moorhead	17c	18c
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★ **A S H E V I L L E N. C.** ★

10c stamp for Catalog and deduct from first order

! **SPECIAL** — Complete VT & Tron receiving set on Formica panel 6 1/2 x 10x3-16, with 43 plate variable and universal coil, \$19.50. !

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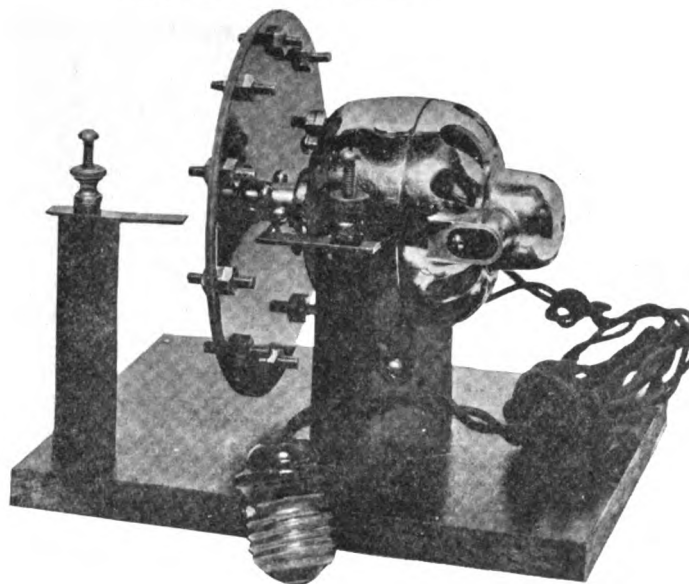
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Is obtained by using a Rotary Gap of
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PUT SOME LIFE INTO YOUR HOT-WIRE
AMMETER—DON'T LET THE POINTER AS-
SOCATE WITH THE ZERO MARK ON THE
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Manufacturers of High-Grade Radio Apparatus

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THE ROTOR:
Genuine Bakelite
5-inch diameter

THE MOTOR:
110-Volts A. C. or D. C.
Highly Finished

THE ELECTRODES:
Heavy Copper Strips
½-inch in width.

THE STUDS:
Heavy Brass
Easily Renewed.

THE STANDARDS
½-inch Round
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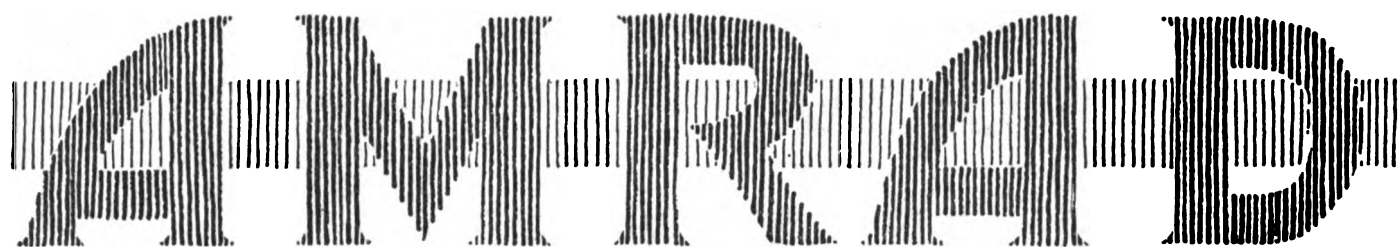
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Up to and includ-
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THE BASE:
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Mahogany Finish

THE CONNECTIONS:
Flexible Cord
With Plug

THE SIZE:
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THE PRICE: \$12.00
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Eleven Pounds
Include Postage



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Radio Equipment Co., 630 Washington Street, Boston, Mass.
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*G. B. Chase, 94 Railroad St., St. Johnsbury, Vt.
Rhode Island Electrical Equipment Co., 45 Washington Street, Providence, R. I.

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Manhattan Electrical Supply Co., 17 Park Place, New York.
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J. Edw. Broadbelt, Jr., 553 E. 38th St., Baltimore, Md.
*Meeks-Collins Electric Co., 411 Granby St., Norfolk, Va.

*Philadelphia School of Wireless Telegraphy, Philadelphia, Pa.
*Shotton Radio Manufacturing Co., Box 3, Scranton, Pa.

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Holt Electric Utilities Co., 134 West Bay St., Jacksonville, Fla.

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*Nola Radio Company, 134 Chartres St., New Orleans, La.

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*Arno A. Kluge, 639 S. Figueroa St., Los Angeles, Cal.
*Western Radio Electric Co., 512 E. 9th St., Los Angeles, Cal.
Pacific Radio Distributing Co., Pomona, Cal.
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*Northern Radio Laboratory, Clyde, Ohio.
*Barker-Fowler Electric Co., 117 E. Michigan Ave., Lansing Mich.
*Radioelectric Shop, 919 Huron Road, Cleveland, Ohio.

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*J. Donald Vandercook & Co., 1st Nat'l Bank Building, Elmhurst, Ill.
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*Springfield Radio Supply Co., 1217 N. 14th St., Springfield, Ill.
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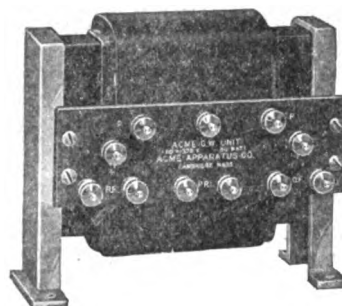
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1½ HENRY CHOKE COILS

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The ACME A-3 MODULATION TRANSFORMER is correctly designed for Radio Telephony without distortion of speech and for maximum modulation.

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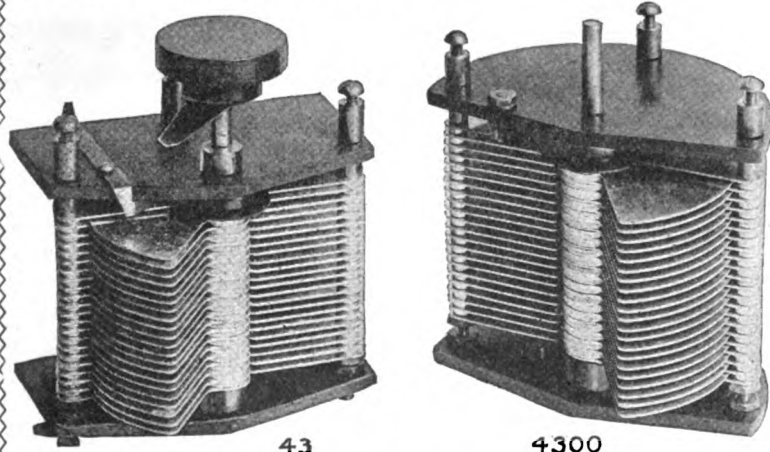
ACME 1½ HENRY CHOKE COILS are designed for use in D. C. circuit when modulating and also serve to iron out current fluctuations.

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Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

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No. 20	2	plate	VERNIER	\$2.00	No. 2300	23 plate, .00075	\$ 6.00
No. 70	7	"	.0001 m.f.	2.35	No. 4300	43 plate, .0013	8.00
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No. 170	17	"	.0003 m.f.	3.15				
No. 230	23	"	.0005 m.f.	3.60				
No. 310	31	"	.0007 m.f.	4.30				
No. 430	43	"	.001 m.f.	5.25				
No. 630	63	"	.0015 m.f.	.....	7.50				
						Either style of condenser fitted with indicating dial at additional cost of 75c.			

Include postage for one pound

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For Results—real long-distance signals on short wave lengths you can't beat the



Relay Receiver (Type CR-3)
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This is the Outfit which made a reputation for itself in the recent QSS tests.

You can get into the Big Relay Game and become one of the dependable long-distance men with this outfit.

Inspect this Outfit at your Dealer's. If he doesn't carry our line as yet, drop us a postal for catalogue, mentioning his name.

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"In the
Good Old
Summer-
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You did not get that C-W set fixed up. Get busy NOW so you will be in for the coming season. We have parts or finished instruments. Only the best get our list before buying.

DEALERS, if you are going to be ready for the Holiday rush, let's have your orders. We are going to publish our dealers list, get your name in. Our apparatus is licensed under Armstrong Patent No. 1,113,149.

Remember—"You may pay more but you can't buy better."

THE PRECISION EQUIPMENT CO.

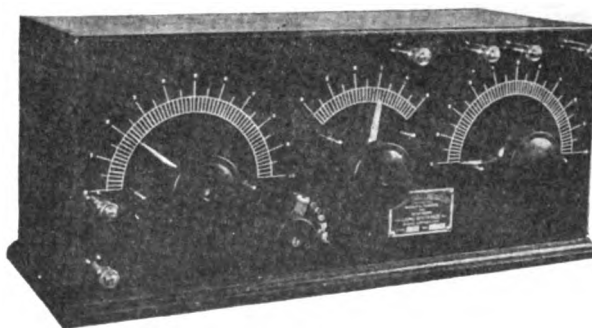
2437 GILBERT AVE., Dept. F
CINCINNATI, OHIO

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The price is only \$1.00 per year. \$1.25 outside the United States.
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Radiophone Music from Alaska With the C. R. L. Paragon!



C. R. L. Paragon Short-Wave Regenerative Receiver

During the week of July 26th, L. J. Simms of station KBC, Billings, Montana, copied radio telephone conversation from Alaska, using our famous C. R. L. Paragon and Amplifon combination. And this in summer!

Think of what the C. R. L. Paragon can do for your relay work this winter!

The C. R. L. Paragon can now be used to receive long wave time signals. Watch for our announcement of the Paragon Time Adapter next month.

C. R. L. Paragon Short Wave Regenerative Receiver, F.O.B. Chicago, \$55.00.

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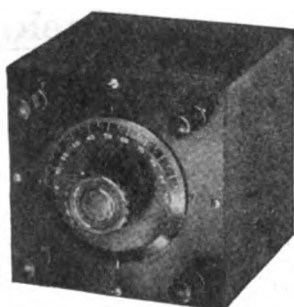
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EVEREADY



Type 12

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Especially Designed**



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TO IMPROVE THE SHORT WAVE REGENERATIVE CIRCUIT

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Type 7 is assembled ready for panel mounting and can be easily mounted by simply drilling a $\frac{1}{4}$ -inch hole in the panel.

Type 12 is a complete unit and consists of Type 7 mounted on a $4\frac{1}{2} \times 4\frac{1}{2}$ bakelite panel incased in a mahogany finished cabinet. Four binding posts are provided so that leads can be connected to any side.

Both types are furnished with a standard 3-inch dial and knob and make a very attractive instrument.

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Type 7G (for grid circuits)	\$ 7.50
Type 7P (for plate circuits)	7.50
Type 12G (for grid circuits)	12.50
Type 12P (for plate circuits)	12.50

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Variometers, \$5; Loose Couplers, \$4.50 to \$9; Audion Panels, \$14; Amplifiers, \$9 to \$20; Grid Condensers, \$.50; Oscillation Transformers, 10. Crystal Detectors; Phone Condensers; Tuners. Instruments and sets made to order. Try "Fodio" apparatus. Send for prices.

Our Motto—"Play Fair with the Amateur"—Our Motto

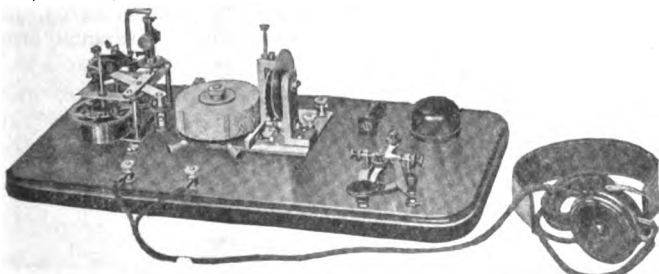
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Far Exceeds the Supply

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This wonderful Set for learning the Code furnished free with our Course

The transmitter shown is the celebrated Omnigraph used by several Departments of the U. S. Government and by the leading Universities, Colleges, Technical and Telegraph Schools throughout the U. S. and Canada. Start the Omnigraph, place the phone to your ear and this remarkable invention will send you Wireless Messages, the same as though you were receiving them, through

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the air, from a Wireless Station hundreds of miles away. When you apply for your license, the U. S. Government will test you with the Omnigraph—the same model Omnigraph as we furnish to our students. Ask any U. S. Radio Inspector to verify this.

FREE POST-GRADUATE COURSE

A one month's Post-Graduate Course, if you so desire, at one of the largest Wireless Schools in N. Y. City. New York—the Wonder City—the largest port in the World and the Headquarters of every leading Wireless and Steamship Company.

TRAVEL THE WORLD OVER

A Wireless Operator can visit all parts of the world and receive fine pay and maintenance at the same time. Do you prefer a steady position without travel? There are many opportunities at the numerous land stations or with the Commercial Wireless or with the Steamship Companies.

FREE INSTRUMENTS AND TEXT BOOKS

We furnish free to all students, during the course, the wonderful receiving set exactly as produced in the illustration. THIS SET IS NOT LOANED, BUT GIVEN TO ALL STUDENTS COMPLETING THE COURSE.

EASY PAYMENTS

A small payment down will enroll you. We will make the payments so easy that anyone ambitious to enter the fastest growing profession—Wireless—may do so.

SEND FOR FREE BOOKLET

Without obligating you in any way, send for our booklet "How to Become an Expert Wireless Operator"—It is free. Mail the coupon below, or postal or letter—BUT DO IT TODAY.

NEW YORK WIRELESS INSTITUTE
DEPT. 17, 258 BROADWAY NEW YORK CITY

New York Wireless Institute
Dept. 17, 258 Broadway, N. Y. City

Send me free of charge, your booklet "How to Become an Expert Wireless Operator," containing full particulars of your Course, including your Free Instrument Offer.

Name
Address
City or Town.....State.....

Wesrad Mail Order Service

Did you take advantage of last month's offerings? Are you one of the many satisfied Wesrad customers who get what they want when they want it? Opportunity raps but once—read on.

Immediate deliveries on the following items, delivered post-paid west of the Rockies.

GREBE

RORH Vacuum Tube Unit.....	\$17.00
RORE Single Stage Amplifier.....	25.00
RORJ Two Stage Amplifier.....	50.00
RORD Detector and Two Stage Amplifier	75.00
RLVD Variable Inductance Unit..	16.50
RKAB Variable Coupler Unit.....	25.00
RCVF Self Balanced Air Condenser Unit	17.50

AMPLIFYING TRANSFORMERS

Acme A2 Fully Mounted	\$ 7.10
Acme A2 Semi-Mounted	5.10
Acme A2 Unmounted	4.60
Federal, Mounted	7.60
Federal, Un-mounted	6.10

CRYSTAL DETECTORS

Murdock, No. 324.....	\$.75
Adams Morgan	1.75
Bunnell, Jove	2.00
Grebe, Dust proof, panel mounting	2.80
DeForest, Dust proof	3.00

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Remler, back or table mounting....	\$ 1.50
DeForest	1.60
General Radio	1.80

VACUUM TUBES

AudioTron, Two Filament	\$ 6.00
Moorhead (AP) Electron Relay	6.00
Moorhead Amplifier-Oscillator	7.00
Moorhead Transmitter	7.50

MISCELLANEOUS

Connecticut Variable Condenser..	\$ 5.00
Amrad Wavemeters	8.50
Acme Modulation Trans.	5.10
Roller Smith H. W. Ammeters, Flush Mounting, 0-2½	7.50
Federal Anti-Capacity Switch....	2.80
Murdock Phones, No. 55, 2000 OHMS	4.75
Murdock Phones, No. 55, 3000 OHMS	5.75

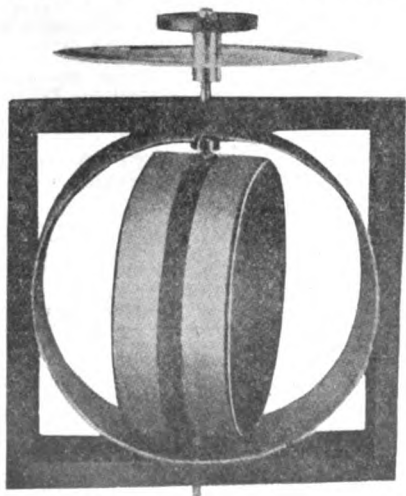
A complete stock of Acme Radio Transformers just received by freight—you know our price policy—'nuf sed. Get the Wesrad habit and you will say what we do, "Why Send East?"

Western Radio Electric Company

550 SOUTH FLOWER ST.

LOS ANGELES, CALIF.

Here is an Unexcelled Value in a Variometer for Regenerative Work on Short Wavelengths



It is designed for use in plate and grid circuits and may be used either for cabinet mounting or otherwise. It is provided with a non-capacity aluminum dial and scale 5 inches in diameter, with a bakelite knob. Guaranteed to be the equal in working quality of any variometer on the market, or your money cheerfully refunded.

Send 15 cents in stamps for our catalogue, illustrating many other values equal to the above. All apparatus either in knock-down or finished form. Dealers write for trade discounts.

OARD RADIO LABORATORIES
"Your Ears Tell"
STOCKTON CALIFORNIA

ARC RADIO APPARATUS

(Continued from page 77)

cast copper tip having a rectangular end. This type is only found in the higher powered converters. C shows a recent electrode design which has found great favor because of its simplicity and ruggedness. It consists of a piece of copper tubing bent into the shape shown and sweated into a screw plug for holding it in place. It will be noted that water circulation is relied upon in all cases for preventing rapid destruction of the tip by the heat of the arc.

The negative or carbon electrode should be made of the hard uncured, uncoated variety of round rod and should be rotated at a speed of about ¼ R.P.M. during the operation of the arc, to facilitate its even consumption. The size will range from ¼ inch for arcs up to the two kilowatt size to ½ inch for the five kilowatt size, and inasmuch as carbon is not a good conductor of heat, the length projecting out of the carbon holder should be a minimum. If alcohol is used in the chamber, the carbon will be found to be consumed at approximately the same rate as it is in the ordinary arc lamp used for illuminating purposes, and if coal gas or kerosene is used, the rate of consumption will be only one tenth to one quarter as great. The most common arrangement of the electrodes has been with the axes coincident, but most recent designs show the electrodes mounted at right angles to one another. In this connection, either a horizontal or vertical arrangement of electrodes may be used. Fig. 8 shows various arrangements.

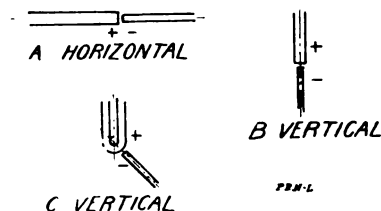


Figure 8

Much of the successful operation of arcs is dependent upon good chamber design. Good insulation and the minimizing of chamber volume are of paramount importance. Fig. 9 shows various shapes of chambers used with small arcs.

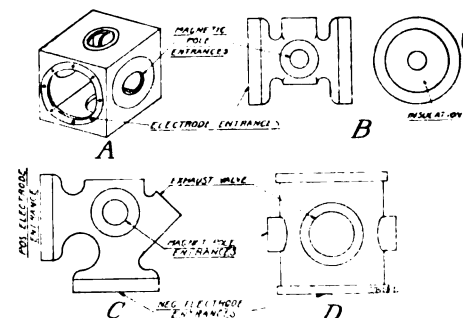


Figure 9

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Much of the successful operation of arcs is dependent upon good chamber design. Good insulation and the minimizing of chamber volume are of paramount importance. Fig. 9 shows various shapes of chambers used with small arcs. A is the common box chamber found generally in the larger sizes. It has six openings, two large ones for the electrode insulation, two for the magnetic pole tips, one for the exhaust valve, and the top one for cleaning and inspecting the interior of the chamber, B is another type of chamber wherein every effort has been made to reduce chamber volume. This facilitates instant operation upon striking the arc and makes possible the use of a minimum of gas. C is a very recent type wherein a 90 degree displacement of the electrodes is used. D is a type popular among experimenters because of its simplicity of construction. It is cylindrical in shape and has two Bakelite discs for supporting the electrodes and sealing the ends. None of the chambers illustrated are water cooled. When converters are designed for inputs in excess of three kilowatts, the chambers should be water cooled also, as very high temperatures result from the use of arcs of this size. Owing to the large amount of metal in the magnetic circuit, heat from the arc is quite easily conducted to parts of the apparatus which might be damaged thereby.

In connection with chamber design for arcs within the scope of this article, there is one more or less rigid rule that should be adhered to as closely as possible. This is, briefly, that any possible current path over insulation from one live part to another of opposite polarity, or to a part intended to be of zero potential, as the chamber, for example, should be at least two inches in length inside the chamber, and an inch long outside; and any gap through space inside the chamber from a live part to a dead one, should be at least $\frac{3}{4}$ inch in length. This rule gives minimum distances and it is to be implied that greater distances between the various parts would be most desirable, provided this does not require excessive bulk and large chamber volume. This variation inside and outside requirements results from the fact that the insulation inside the chamber is subject to various deposits, such as soot, which greatly impairs its insulating qualities.

(To be continued)

Your Classified Advertisement in "Pacific Radio News" will reach the class of amateurs who need apparatus. Don't throw your old apparatus away—there may be a dozen of our readers who are looking for the very instruments that you no longer need.

Materials and Parts

FOR THAT NEW SET YOU ARE BUILDING, WE HAVE IT

Brass sheet, round and square rods, sheet aluminum, fibre, bakelite and hard rubber cut to size, machine and wood screws, binding posts, switch points, knobs, insulators, switches of all types, variable and fixed condensers, and cardboard tubing.

Murdock, Acme, Tresco, Bunnell, Moorhead, Parkin and Burgess products in stock and we can give you the service you want. Our new catalogue sent for 5 cents, which will be refunded on first order for one dollar or over. Try us on your next order.

KEYSTONE RADIO CO.

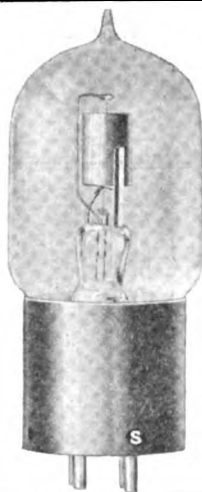
DRAWER 307

GREENVILLE, PA.

VACUUM TUBES

GIVEN FREE TO OUR READERS

AN UNUSUAL AND EXTRAORDINARY OFFER



Combination No. 1

The A-P Tube
AMPLIFIER
OSCILLATOR
DETECTOR

GIVEN FREE WITH A FOUR-YEAR
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Specify what type tube is desired.

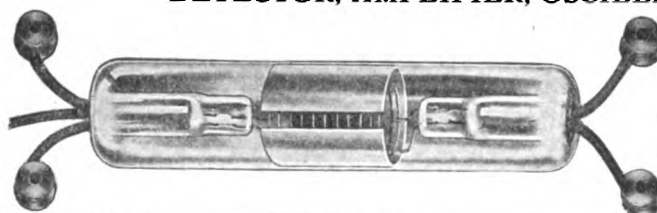
Add 25 Cents for mailing charges.

All tubes are genuine and guaranteed



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The Tubular Audiotron
DETECTOR, AMPLIFIER, OSCILLATOR



Given free with a four
year subscription to
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All tubes are genuine
and fully guaranteed
by the manufacturer.
Add 25 cents for mail-
ing charges.

These Instruments will be Awarded on Extensions, Renewals or New Subscriptions.
Subscription Rate \$2.00 per year.

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PACIFIC RADIO PUB. CO. 50 Main St., San Francisco, Calif.

Herewith is \$..... and..... cents for Mailing Charges.

Please send "Pacific Radio News" for..... years to:

Name..... Street & No.....

City..... State

You will also promptly mail me the apparatus described in Combination No.....

When writing to Advertisers please mention this Magazine

RADIO TELEPHONE

and C. W. Supplies of Every Description

METERS

Type RTS 0-500 Volt DC 3-in. Flush type	\$15.00
Milliammeter, Scale 0-100 3-in. Flush type D'Arsonval	9.00
Model 301 Weston DC Ammeter 0-2 for filament reading	13.00
General Radio 0-1 Hot Wire Ammeter, 3-in. Flush Type	5.00
Same type 0-2.5	5.00

CONDENSERS

1 MFD Fixed Condensers, 1,000 volt test	\$ 2.25
½ MFD Fixed Condensers, 1,000 volt test	2.25
We carry a full line of all standard makes of both fixed and variable condensers.	

INDUCTANCES

RT-1. 5-in. diameter. Tube 6-in. long with No. 14 hard drawn copper wire	\$ 4.50
RT-2. CW Inductance, 6-in. long, with bakelite panel, two switches, taps taken off every other turn	7.00
RT-3. CW Inductance, Electromagnetic circuit type complete, less panel and switches	7.00
RT-4. Same as above with panel	9.00
R-T5. Electromagnetic type with variable grid coil	11.00

MODULATION TRANSFORMERS

Acme. Semi-Mounted	\$ 5.25
Acme. Fully Mounted	7.00

AMPLIFYING TRANSFORMERS

Federal	\$ 7.10
Acme, Mounted	7.50
Acme, Unmounted	4.50

SOCKETS

Remler, all Bakelite	\$ 1.50
General Radio	1.75
DeForest	1.60

CHOKE COILS

1½ Henry 500 M. A.	\$ 6.50
1½ Henry 150 M. A.	4.25
Two coil type	8.50
Radio Frequency choke coil	2.00

VARIOMETERS

We have just received a supply of the NEW Clapp-Eastham Variometers.	
Price, without dial and knob	\$ 6.00
With dial and knob	6.75

RHEOSTATS

General Radio 1½ Ampere carrying capacity. 7 OHM Panel Type	\$ 2.50
Remler, large size panel type	1.75
Small Size	1.00
White Porcelain base, 10 OHMs	1.25

KEYS

Small Telegraph key for CW buzzers	\$1.50
------------------------------------	--------

BUZZERS

Back mounting adjustable knob, through panel	\$ 2.75
Century	2.00

VACUUM TUBES

A-P Transmitter tubes	\$ 7.50
A-P Amplifier tubes	7.00
A-P Detector tubes	6.00
Audiotrons	6.00

We are the manufacturers of the Pen Brand Grid Condensers. Price...\$ 1.00

Visit our booth at the Pacific Coast Radio Convention exhibit.

We do not issue a catalog. Keep this page for reference.

A COMPLETE LINE OF RECEIVING AND TRANSMITTING SETS AND PARTS

GIVE US A TRIAL. WE APPRECIATE YOUR BUSINESS AND YOU WILL APPRECIATE OUR SERVICE

THE RADIO TELEPHONE SHOP

175 STEUART STREET

SAN FRANCISCO, CAL.

Buy Your Radio Apparatus on the Pacific Coast

De Forest, Amrad, Radisco, Bunnell, Murdock, Moorhead and other apparatus carried in stock at list prices F.O.B. Seattle.

MAGNAVOX AGENCY

Arco Amplifying Transformers	\$5.00
Federal Transformers	7.50
Mica Grid Condensers	.50
Genuine Navy Rheostats	2.75
45-volt "B" Batteries	5.00
Audion Panels	11.00
Audion Panels (professional)	15.00
1-stage Amplifier	22.50
2-stage Amplifier	40.00

We reached Portland (150 miles) with our type "O" Radiophone using AC. Why not install one?

Northwest Radio Service Co.

609 Fourth Avenue

Seattle, Wash.

FORMICA

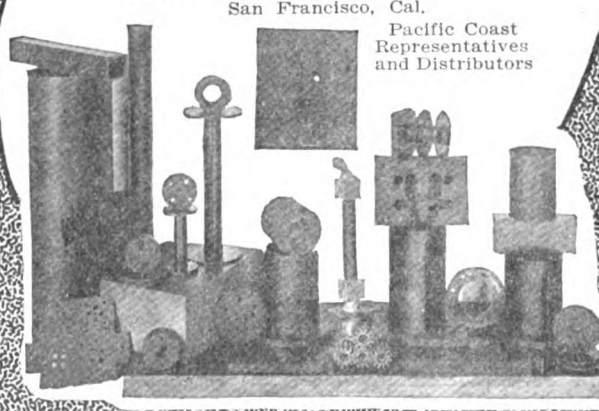
Many manufacturers of radio apparatus use Formica exclusively because of its exceptional tensile and dielectric strength. Formica on account of these qualities is ideal for many mechanical uses also.

Write for data and prices.

THE FORMICA INSULATION CO.

Cincinnati, Ohio.

"The Hermans-Griffith Co., Sheldon Bldg.
San Francisco, Cal.
Pacific Coast
Representatives
and Distributors"



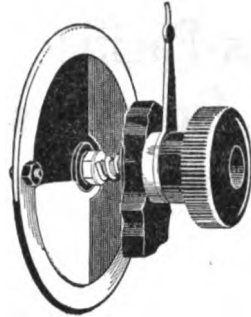
SHEETS TUBES RODS

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WIRELESS AND COMMERCE

THE French postal authorities are making a great effort to apply wireless telegraphy to the needs of commercial men. Since June the Eiffel Tower and Lyons stations have been authorized to transmit messages on certain lines. From the Eiffel Tower messages have gone to Belgrade and Budapest, and from the Lyons station to Annapolis, near New York, and negotiations are at present taking place for a new line between Paris and Bucharest. Although the services are working well, it is admitted that French business men are loth to entrust their telegrams to the Hertzian waves, preferring the ordinary cables. With a view to encouraging them to make use of wireless telegraphy it is pointed out that France is not well off in the matter of cables, and has in fact to make use of the British lines. There are complaints of long delays through the messages of British merchants being accepted first, and there is a suggestion that as a result French business men lose the race for orders, their British competitors getting in first.

This is one of the reasons why it is sought to develop wireless telegraphy and to urge French commercial men to use it. By the end of next month it is expected that the Lafayette station, near Bordeaux, will be ready to receive commercial and other messages for America and for other parts of the world. This powerful station was made by the Americans in order to insure rapid communication between the General Staff of General Pershing and America. The installation was begun in May, 1918, and the work was finished last month, when trials were begun, and will last until the end of September. The station will then be handed over to the French postal authorities. It is claimed that it is the most powerful station in existence, and that it can not only send messages 12,500 miles, as was predicted two years ago, but to the ends of the earth. As the waves travel as quickly as light—that is to say 187,500 miles a second—it is claimed that they can make the tour of the earth in one-seventh of a second. It is hoped that Bordeaux will become a wireless telegraphy office for communicating with America. A day and night service is contemplated, and it is calculated that it will be possible to send 72,000 words every twenty-four hours. It is the intention to use this station to connect France with her colonies, and there is a talk of installing at Saigon, in Indo-China, a station as powerful as that at Bordeaux, and other posts in Algeria, French West Africa, the Congo, and Madagascar.—London "Daily Telegraph."



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

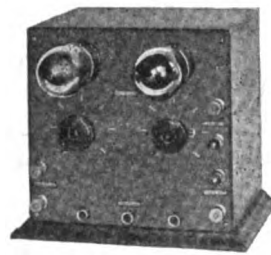
Write for full description of this new invention

Ask for Circular No. 16

Dealers: Write for discounts

PARKIN MFG. CO.,

San Rafael, Calif.



MYCO TWO STEP AMPLIFIER

By actual test has proved itself
the most efficient and reliable
Amplifier on the market

A Few Important Features:

Individual Filament Control, Plug and Jacks for Changing From Detector, One or two Steps of Amplification, Federal Transformers, Bakelite Panel, Hand Rubbed Finish and Mounted in a Quartered Oak Cabinet. Will Operate From Same "A" and "B" Battery Used for the Detector Circuit With Same Amplification. Constant.

Price, less Tubes \$50.00

We can supply from stock practically all apparatus manufactured by the following concerns. Mail orders shipped same day as received.

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GENERAL COMPANY
WM. J. MURDOCK CO.
FEDERAL TEL. & TEL. CO.
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CLAPP EASTHAM CO.
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MOORHEAD LABORATORIES
SIGNAL ELECTRIC CO.
INTERNATIONAL RADIO

MAGNAVOX CO.
THORDARSON ELEC. MFG. CO.
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TEL. CO.
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RADIO SHOP
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And many other well-known manufacturers. Dealers: Write for proposition on any of the above lines

Consolidate Radio Call Books \$1.25 Each

Do not fail to visit the Radio Show at the Pacific
Coast Radio Convention

LEO. J. MEYBERG CO.

Successors to Haller Cunningham Electric Co.

428 MARKET STREET

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BURGESS "B" BATTERIES

SEVERAL SIZES FOR SPECIAL WORK



SEND FOR CATALOGUE
BURGESS BATTERY COMPANY
HARRIS TRUST BLDG. - CHICAGO, ILL.

Trans-Pacific Radio Operators Log

By W. Breniman
and G. E. Knudsen

A 32-Page Pamphlet containing reliable data on Pacific Coast Radio stations, call letters, weather reports, time signals, wave length data, press schedules, etc.

EVERY COMMERCIAL OPERATOR SHOULD HAVE A COPY
Ready For Distribution on

November First
Price 35 cents

W. BRENNIMAN
Room 420 24 California St.
San Francisco, Calif.

Audion Control Panel

With this panel the regular Marconi 4-prong bulb, an Audiotron can be used. Same shipped to any part of the U. S. for \$6.50.



Grid Condensers, each\$.35
Stopping Condensers, each35
Brass Contact Points, 1-4x1-4x
5-16 shank, dozen35
2000 Ohm Phones, each 4.50
3000 Ohm Phones, each 5.50

Radisco Coils—
LRD 40 ...\$0.70 LRD 175 ...\$1.15
LRD 100 ...\$0.95 LRD 550 ...\$1.65
LRD 325 ...\$1.40 LRD 1200 ...\$2.65
LRD 750\$2.00

Tap Coils—
LRD 325 3...\$1.70 LRD 750 3....\$2.30
LRD 1200 3....\$2.90

Coil centers plain.....Pair \$0.25
Coil mounting for Radisco Coils.. 6.00
Send 10c for Catalog

Agents for RADISCO Apparatus
KELLY & PHILLIPS
Brooklyn's Wireless Store
312 Flatbush Ave. Brooklyn, N. Y.



Our Trademark

is a sign that you can buy any Radio apparatus of proven merit manufactured in the United States, from us.

SWITCHES

Rotary, as illustrated.....\$.45
Others25c, 60c, 65c, 1.00



SLIDERS

Brass, 3-16 x 1/4 inch\$.40

Our new price list, now ready, will be mailed anywhere.
Send five (5) cents for postage

American Electro Technical Appliance Co.
Dept. R. 235 Fulton Street **NEW YORK**

PAGE 99

Has a surprise for you. Subscribe to Pacific Radio News and get a Vacuum Tube FREE.

PACIFIC RADIO SCHOOL ARC AND SPARK SYSTEMS

THE MOST UP-TO-DATE AND EXCLUSIVE RADIO SCHOOL IN THE WEST. LATEST TYPE POULSEN 2 KW ARC TRANSMITTER AND INDEPENDENT TYPE ONE KW 500 CYCLE SPARK SET. EQUIPMENT IN ACTUAL OPERATION.
NAVY STANDARD RECEIVING SET WITH AUDION AMPLIFIER. UNDER THE PERSONAL SUPERVISION OF ADDISON S. MCKENZIE, CHIEF ELECTRICIAN, U. S. N. R. F., FORMERLY INSTRUCTOR AT MARE ISLAND NAVY YARD AND W. A. VETTER, FORMERLY CONSTRUCTION FOREMAN FOR THE MARCONI WIRELESS TEL. CO. INSPECTION INVITED. SEND FOR DESCRIPTIVE CIRCULAR.
483 NEW CALL BUILDING **SAN FRANCISCO**

Clear, Sharp, Readable Signals With Brandes Matched-Tone Receivers

A set of Brandes receivers is like two violins tuned in exact unison; the signals coming clear, sharp and readable, and carrying through the longest distances. This "matched tone" feature is found in no other receivers.

Amateurs and Professionals

In the choice of wireless outfits amateurs can safely be guided by professionals, who are enthusiastically endorsing

BRANDES Matched-Tone RECEIVERS

with which they are making wonderful records, under all conditions, in the United States and abroad.

Our Special Trial Offer

Send seven dollars for a Brandes "Superior" Head Set and use it for ten days—putting it to the severest tests. If it doesn't prove all our claims for it and meet all your expectations, return it and your money will be refunded promptly. Send 5c for "Catalogue P."

C. BRANDES, Inc.

32 Union Square, New York
Room 822
Wireless Receiver Specialties

Stratton Electric Company

Wireless Material, Parts, Small Instruments of All Makes, Educational Books. Send for List No. 5.

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RADIO EXCHANGE

354 PERRY STREET OAKLAND, CAL.

Official head-
quarters Bay
Counties Radio
Club.

**A
ACE
E**

Sole Agents for
New ACE
Products
Phone Carroll
at Oakland 6169

RADIO EXCHANGE OAKLAND 7892

Audion Control Panel.....\$7.80

Audion Control Panel and one-step
amplifier17.90

One-Step Amplifier11.00

Two-Step Amplifier21.00

Above are complete panels less bulbs and "B" Batteries. A-No. 1 apparatus and absolutely guaranteed. Your money refunded and no questions asked if goods do not prove to be perfect in construction. Purchaser paying express charges. Mounted and unmounted Honeycomb and Duolateral coils. Mount 'em yourself and save money. We are dealers in Murdock, Parkin, Grebe and DeForest apparatus. We carry a full stock of parts and necessities. Write for information. Exclusive agents for OARD apparatus. Send 10 cents for catalog. We offer 50% off on all OARD goods K/D. Put 'em together yourself and save 50%. C. O. D. shipments upon receipt of one-half payment.



KLAUS RADIO Co.

Eureka, Illinois

Mfrs. of Electrical Specialties
Distributors for

GREBE	MOORHEAD
DE FOREST	BALDWIN
MURDOCK	BRANDES
AMRAD	ACME
THORDARSON	AMCO, ETC.

Bulletins issued Monthly

New!-The "Nucleus" \$36

consists of a carefully grained and finished Bakelite panel, fastened to a Mission oak base, at the top is mounted a \$10 General Radio Flush Type Hot Wire Radiation Meter; a \$5 Western Electric Microphone and Type J Flush, Plate Current Milliammeter. Below is mounted a .0006 Type C.S.U. Variable Condenser with Silver Plated Navy Dial Indicator.

Additional instruments may be mounted and connected, thereby making a first class wireless 'phone, at minimum expense and bother. Investigate, or—

Place your order now for promptness.
DEALERS—No Patent Complications.
C-W & RADIOPHONE ACCESSORIES
SEND 4c FOR BULLETINS

DO YOU USE HONEYCOMB COILS?

Somerville Radio Laboratory

Manufacturing Designers
Wholesale and Retail Distributors
102 Heath St. SOMERVILLE, HS, MASS.

We are in need of subscription solicitors in every city of the U. S. Write today for our proposition.

ACOUSTIC TUNING

(Continued from page 85)

length of the sound emitted by the telephone, after the electrical tuning has been properly cared for, we have a means at our disposal for tuning out interference which is bound to fill a long-felt need.

Just as the spark frequencies, which have nothing to do with the electrical wave length, cause the telephone diaphragms to vibrate and produce a note at the receivers corresponding to the note produced at the transmitting station by the spark discharge and just as acoustics enable us to differentiate between these notes, so it is with static.

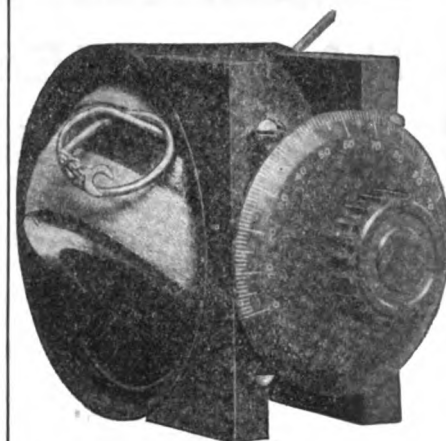
The interference caused by static is not confined to any wave length and regardless of the tuning qualities of any receiving system, static will force its way through. But it is a fact that the frequency of static discharges in comparison to the spark discharge of a modern radio transmitter is low. The note produced in the telephones is therefore of a low pitch. From this it will readily be seen that a method of tuning to the resonance point of the sound produced by the telephone receiver will permit us to cut out the static and hear the signal or cut out the signal and hear nothing but static.

When receiving undamped signals the method of tuning is somewhat different and the note produced in the telephones, instead of depending upon spark frequency, depends upon the difference between the wave sent out by the transmitting station and the wave sent out by a local oscillator. This local oscillator may be either of the heterodyne or autodyne type. Variation of this difference of wave length permits us to cause the telephone receivers to produce any desired pitch. The field of acoustic tuning is thereby very much broadened.

The value of acoustic tuning will undoubtedly be felt very strongly and it is bound to revolutionize our present system.

Pacific Radio News has been informed by the Nostat Company that tests are now under way, in the Gulf of Mexico, where King Static formerly reigned, and very marked results have been noted. Acoustic tuners are now being used on trans-Atlantic vessels, as well as those running between Gulf and Atlantic ports, and arrangements are now being made for their installation on Pacific steamers, as well as shore stations throughout the country.

These machines are on exhibit at the office of C. C. Langevin, 24 California street, San Francisco, and those interested may see the device in operation.

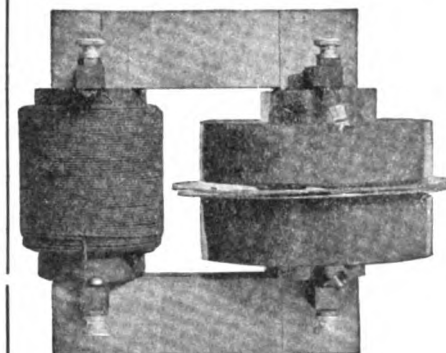


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

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The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

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We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

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"The Radio Telegrapher"

Official Organ
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Read about what's going on among the Commercial, Navy and Army operators

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AT SHORE STATIONS
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Radio Sales Co., 251 Duboce Ave., S. F.



DUCK'S New Big 200-Page No. 14 Wireless Catalog and 100-Page Electrical Catalog

The wireless catalog mailed for 12c and the electrical catalog for 6c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. Everything in wireless worth while is listed in this catalog. The experienced amateur will tell you to see our catalog before buying. You are thereby insured against an unwise purchase. It is the Beacon Light to guide you right in the selection of your wireless apparatus. No bigger or better values are obtainable elsewhere.

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

Get Bigger Pay through ELECTRICITY



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THEO. AUDEL & CO., 72 Fifth Ave., N. Y. Please submit for examination Hawkins Electrical Guides (Price \$1 each). Ship at once, prepaid, the 10 numbers, if satisfactory, I agree to send you \$1 within seven days and to further mail you \$1 each month until paid.

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RADIO APPARATUS

Electric Supply and Repair Co.

Frank P. Herrguth Al Rosenberg
Formerly of Paul Seiler Electric Works

520 Market Street

San Francisco, Cal.

When writing to Advertisers please mention this Magazine

RADIOTORIAL

(Continued from page 75)

when every man will have to earn, fairly and squarely, every cent of his salary.

And the operators, that great mass of men in our radio industry who keep the name of "SERVICE" ever upon the door of the radio stations at shore and at sea—they too are settled down to a lesser group of men. The war made thousands upon thousands of radio operators, but of these, we all know too well, many were not adapted for the game that requires not only ability but talent. Now the profession has simmered down to those men who can "pound the brass" and do it well, ready to give service for a fair salary.

Last, but not least, are the amateur radio men who are the engineers, operators and manufacturers of the future. Most of these men are just beginning to get their sets into good order and into shape for the coming winter. Many of the amateurs are contemplating the installation of tube transmitters. This is certainly good to observe, because if there is anything that will solve the eternal QRM problem amongst amateurs it is the tube transmitter. A thousand amateurs with properly built vacuum tube sets could work together or with other amateurs in outlying districts, and all be within a city without interference of any kind. So we see ahead of us, in the amateur game, a period of upbuilding and construction and progress. More enjoyment, better sets and more general satisfaction amongst amateurs is the coming thing.

The convention will bring all the radio men of the Pacific Coast together; commercial operator, amateur, manufacturer, government radio men, all will meet in San Francisco in one big open-hearted handshake, and after the three big days, will return to their homes for a successful and prosperous year, enlightened and contented.

EQUIPMENT of all lighthouses with wireless will reduce the dangers from fog to a minimum, according to Frederick Kolster, radio expert of the Bureau of Standards, who was here from Washington inspecting the new radio compass stations which were established last week to aid vessels in finding their positions offshore.

Kolster has designed a system by which short wave signals can be sent from lighthouses and lightships that can be picked up by captains on approaching shore and thereby obviate the use of the compass stations and the operators. By this system a captain could adjust his compass to the signals and proceed to port without danger of running ashore.—S. F. "Call."

The San Francisco Radio Club INCORPORATED

Invites the Radio World

TO THE FIRST

Pacific Coast Radio Convention

TO BE HELD IN SAN FRANCISCO DURING THE LATTER PART
OF NOVEMBER

THIS INVITATION is extended to you, as a brother Radioman, Amateur, Commercial, Governmental, or otherwise, for the sole purpose of being favored by your presence at this, the most important undertaking on the Pacific Coast in our entire radio history.

THE PURPOSE of the convention is to bring together the Radiomen from every nook and corner of the continent, in order to discuss the development of the radio art since the signing of the Armistice.

SPEAKERS of prominence will address the visitors, and many vital factors will be discussed. Plans for the betterment of amateur radio will be formulated. It is proposed to make the convention an annual affair. We have many surprises in store for you, and it is to your own advantage that you favor us with your presence. If you have the interest of radio at heart, seriously; if you want protection from radio laws and bills that are introduced from time to time; if you want to know how good the radio game really is—then, by all means, come to the convention.

RADIO Clubs are requested to send delegates to the convention. A general invitation is extended to members other than delegates. The committee on arrangements will provide hotel accommodations for out-of-town guests. Your inquiry will be given personal attention.

THE MAIN CONVENTION will open on Thanksgiving Night, Thursday, November 25th. An elaborate radio show will be staged. Leading manufacturers will have their products on display.

ABANQUET, "the kind that's different," a radio ball and other social features will be a part of the affair. We ask you to mail us the blank at the foot of this advertisement. A bid to attend the convention will reach you by return mail. We will also advise you of the time and place where the convention will be staged. The general public will be admitted to the exhibition and ball, but only those who possess a bid will be admitted to the convention proper. A nominal charge will be made to visit the exhibits and the ball, but there will be no charge for your seat at the convention.

The Committee on Publicity

**WE
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For the Good of the Game

Give it the widest publicity possible. Tell every one of your friends about it. Announce it "via radio" from your station.

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YOUR
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SAN FRANCISCO RADIO CLUB, INC. S. F. GYMNASIUM CLUB
2460 SUTTER ST., SAN FRANCISCO, CALIF.

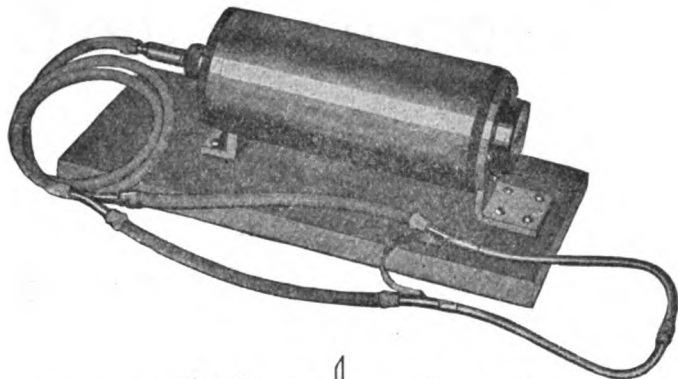
You will please reserve..... seats for myself and..... radio friends, who will attend the convention. It is understood that there will be no charge for this service.

Name..... Address.....

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"Conqueror of Static"



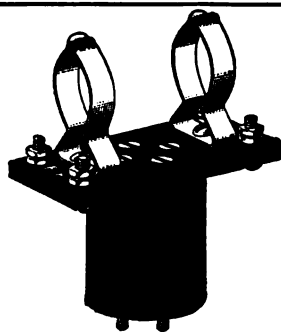
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equipment you can not
afford to be without

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We make special instruments
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Attention Amateurs!

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Tuition ten dollars a month for either the day or evening sessions
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ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

FOR SALE—Four Western Electric VT2'S and 3 VT1'S at \$16.00 and \$8.50 each, or \$85.00 for the lot. VT1'S oscillate at 22½ volts, amplify at 35-40. Also 1 Willard 6V. 60-40 amp. hour storage battery, 3 months old, cost \$34.00, sell at \$24.00, and 1 6V. 20-30 amp. hour universal glass jar storage battery. Cost \$17.00 sell at \$12.00. Tubes sent prepaid. All the above apparatus guaranteed to be in perfect condition. Send for list of other apparatus. JOHN TITCOMB Nogales, Arizona.

ALL AMATEUR APPARATUS bought or made in accordance with the Radio Buyers and Builders Handbook invariably resell very profitably. Study my June, July and October display advertisements. See why and get your copy now. R. CLARK, Barnes Road, Newton, Mass.

"Storage batteries, for audion filaments, etc. Guaranteed two years, 6 V 40-60 amperes \$16.00. 6V 60-80 amperes \$19.00. Immediate delivery, dealers wanted." WILLIAM SCHICK, 2723 Cooper Ave., Brooklyn, N. Y.

THREE STEP AMPLIFIER. Modeled after the French type. Has three amplifying transformers, three tube sockets, filament control rheostat, switch for changing from Detector and Two Step Amplifier or Straight Three Step Amplifier. In good condition. Price \$98.00. H. E. MATT, 1701 Franklin Street, San Francisco, Calif.

A GOOD CHRISTMAS RADIO STORY WANTED.—1500 words in length. Send manuscripts to the Editor of "Pacific Radio News", 50 Main Street, San Francisco, Calif.

Our Paragon Rheostat

has become the standard filament resistance. For back of panel or table mounting. 2¼-in diameter. 6 ohms., 1½ amps.

\$1.75 Postpaid

Immediate shipment.

Standard VT Socket \$1.00. Why pay More?

44 Volt Variable "B" Battery, \$3.60

Include Postage on 4 Lbs.

Complete in handy wooden case and adjustable phosphor-bronze "Jiffy" connectors. Better than block batteries! If one 4.4 V. unit weakens prematurely, it can be removed and replaced, thereby not impairing the total voltage—making this the best battery value on the market.

Audiotron Adaptor

Consists of standard 4-prong base with brass supporting connectors. Permits mounting tube in vertical position, so filament will not sag and touch grid.

\$1.75 Postpaid

Aerial Wire 1c Per Foot
7 strands No. 22 solid copper—tin plated to prevent oxidation. Include postage on 15 lbs. per 100 feet.

Ground Wire 8c Per Foot
\$7.00 Per 100 Feet

No. 4 solid copper—triple braid—rubber covered. Include postage on 20 lbs. per 100 feet.

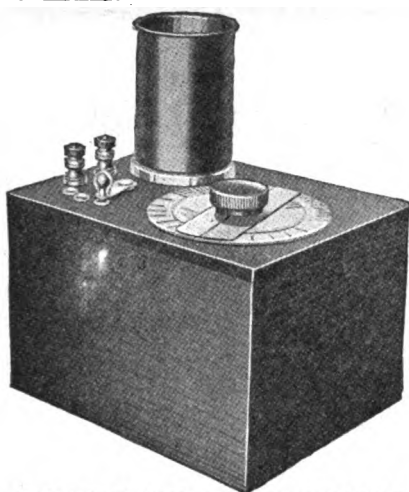
Lightning Switch, \$4.00
600 volts, 100 amps., S.P.D.T.

Radio Equipment Co.

630 Washington St.
Boston-11, Mass.



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**DOOLITTLE DECREMETER**

A superior Wavemeter and a Decremeter in one instrument. Will enable you to adjust your station to the legal requirements and at same time improve the efficiency of your transmitter. **PRICE \$25.00**

Shipping weight 4 lbs.

F. M. DOOLITTLE CO.
157 Valley St. New Haven, Conn.

Radio Engineering Principles

By Henri Lauer and H. L. Brown

This is one of the first books to cover progress in radio engineering during and since the war. It contains much valuable information on vacuum tube theory and practice. A worthy addition to any wireless man's library.

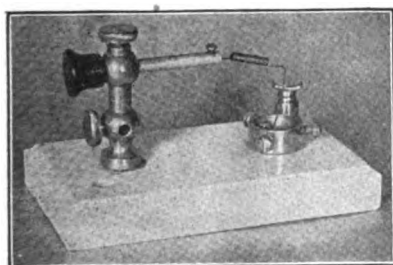
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THE ONLY WIRELESS MINERAL
DETECTOR MADE ON A SOLID
PORCELAIN BASE. See Cut



This Mineral Detector is a most valuable device to eliminate the Amateur's troubles in Wireless Operating

PRICE \$2.25 EACH

Including Parcel Post Charges

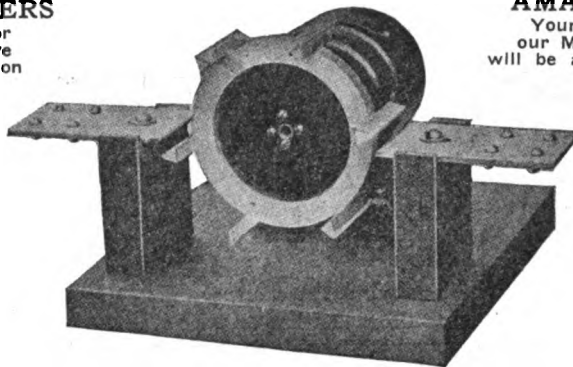
J. N. BREIDENBACH
2413 North 16th St., Phila., Pa.

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Attractive
Proposition

AMATEURS

Your Name on
our Mailing List
will be appreciated



OUR GAP ILLUSTRATED ABOVE IS MEETING WITH THE APPROVAL WE ANTICIPATED AND PRICED AT \$50.00 WITH EITHER SIX OR TWELVE POINT ROTOR. MOTOR SEPARATELY \$15.00—ROTOR ONLY \$25.00.

New Instruments

Vacuum tube control panels and amplifiers, unit panel type. Oscillation Vacuum tube control panels and amplifiers, unit panel type. Oscillation transformer, highly efficient. Antenna switch, mighty good and reasonably

Wireless Manufacturing Co. Canton, Ohio

**HOOK 'ER TO YER BULB**

THE MOST WONDERFUL TUNER IN THE WORLD \$10.

Add Parcel Post
COILS ONLY \$6.00

A WONDERFUL TEST. CAN YOU BEAT IT?

During the out-door meet of the convention of the A R R L at Chicago, September 3, one of our 20000 Meter tuners was set on the sand in front of 9 Z N Radio Station and the aerial was nothing but a bell wire 50 feet long lying on the sand. The ground was tied to the ground lead of 9ZN. Two pairs of phones permitted everyone willing to read all the Arc stations going at that time. Good readable signals and the time was from 3 to 6 P. M. A further test was made in room 760 Edgewater Beach Hotel by hanging the 50 foot wire out of the window and the ground was tied to a radiator. European stations were copied all night. All the leading amateurs of the middle west were at the meeting.

KNOCKED DOWN OR ASSEMBLED CONDENSERS

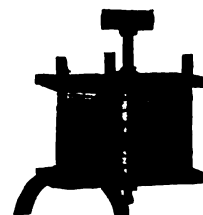
Which kind do you want? Made for panel mounting and are complete with scale, pointer and knob. Used all over the world. No C. O. D. orders, add Parcel Post. Buy from your local dealer or send us his name if he can't supply you. Formica tops and bases. Movable plates are now held by nuts and not clamped with washer as formerly

11 Plate K.D.	\$1.80
21 Plate K.D.	2.25
41 Plate K.D.	3.20
11 Plate assembled	2.75
21 Plate assembled	3.25
41 Plate assembled	4.25

Tuners Licensed under Armstrong Patent

WE SELL BULBS, RHEOSTATS, WAVE METERS, BINDING POSTS
SEND 5c FOR CATALOG

Sold by **TRESCO, Davenport, Ia.** or your dealer.

**"B" BATTERIES**

Made by Everready Battery Co.

Guaranteed 45 volts
Six Taps

\$5.00 Prepaid anywhere in the United States

We also build any type of set to order. Send us your specifications

Ets-Hokin & Galvan

Wireless Engineers

10 MISISON STREET

SAN FRANCISCO

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DESIGN - WORKMANSHIP - PERFORMANCE

KENNEDY
EQUIPMENT

KENNEDY RECEIVING EQUIPMENT IS SETTING A NEW HIGH STANDARD OF QUALITY IN APPARATUS FOR THE RADIO AMATEUR AND EXPERIMENTER.

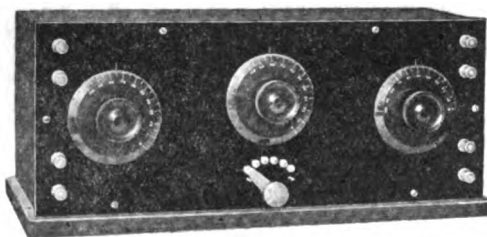
IT IS BUILT FOR THOSE WHO ARE SATISFIED WITH NOTHING SHORT OF THE **BEST**—FOR THOSE WHO TAKE PRIDE IN MAKING RECORDS THAT ARE BETTER THAN THEIR NEIGHBORS'—FOR THOSE WHO WANT THEIR STATIONS TO HAVE THE APPEARANCE OF CAREFUL, EXPERT DESIGN BY THOSE WHO KNOW HOW. **ARE YOU IN THAT CLASS?**

IF YOUR DEALER CAN'T SUPPLY YOU WITH KENNEDY EQUIPMENT, WRITE US YOUR REQUIREMENTS, AND MENTION HIS NAME.

THE COLIN B. KENNEDY COMPANY

RIALTO BUILDING

SAN FRANCISCO



ANNOUNCEMENT

Negotiations have recently been completed with THE RADIO SHOP of San Jose, California, whereby The California Electric Supply Company will distribute their entire output of Short Wave Regenerative Receivers, Variometers, and Vario-couplers

A slight increase in price is necessary to meet added costs of material and to facilitate prompt delivery to our patrons. We will, however, fill all orders received before November 15th at the old prices. This will give all an opportunity to obtain these already well-known units before new prices are effective.

NEW PRICES

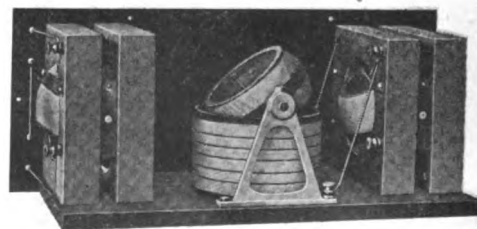
(Effective November 15th.)

RADIO SHOP Short Wave Regenerative Receiver.

Licensed under Armstrong U. S. patent No. 1,113,149..\$50.00

RADIO SHOP Variometers, each..... 10.00

RADIO SHOP Vario-couplers, each..... 8.00



Manufacturers and Dealers: Write for Attractive Trade Proposition

Descriptive literature now on the press. Write for your copy.

California Electrical Supply Company

643 MISSION STREET

SAN FRANCISCO, CALIF.

Amplification 100 Times

Do you want to receive signals of marvelous strength; to hold those that gradually fade out and to bring in stations that you have never heard before? You do not need a big aerial to get them—use the new



Paragon RA-Ten

**Amplifying
Short Wave
Receiver**

Licensed under Armstrong and Marconi Patent, 1,113,149.

Greatest Improvement in Modern Radio

Do you remember the super-service of the old original Paragon RA-6 amplifying short-wave receiver? This new set surpasses it in every respect.

And the original RA-6 was the only one of its kind.

150 per cent improvement over the old original Paragon, away ahead of all other receivers and excels the most serviceable set on the market today.

Here are the 150 per cent Pointers

A wave length range of 160 to 1000 meters.

24 per cent more sensitive and selective than the RA-6.

All amplification obtained without change of spark tone.

Unpleasant effect of change in note entirely eliminated.

Coupling has scale of 180° instead of 90° giving wider range of coupling.

Controls on all adjustments fitted with vernier attachments permitting of very fine tuning control.

Reduces end losses.

Set of quartered oak; overall size 20½x8x7½ inches; white filled engraving, bakelite knobs and dials.

Set sealed before leaving factory, which is a guarantee for two years.

Best product of Adams Morgan Co's unapproachable engineers.

Net price \$85.00.

Many surprises in store for you if you will send for special bulletin describing this set.

Beat the old Paragon—this one beats it and all others by miles—our special bulletin tells you how, send for it—its free.

Our word of honor to you is our guarantee. Let us prove it.

Continental Radio and Electric Corp.

Sole distributors of the New Paragon RA. Ten

LASI, Secretary

J. STANLEY, Treasurer

EPT. G. 7.

6 WARREN STREET

NEW YORK

Radio—Co-operation of Radisco Instruments

Did you ever stop to consider the "Radio-Co-operation" of the instruments you buy? How do they co-operate and conform with each other, when they are hooked up in your station? Do you get the strength of signal that only comes from apparatus "that works in harmony."

RADISCO apparatus does just that; every single instrument turned out by Radisco Engineers is a piece of master craftsmanship which must be subjected to the most rigid scrutiny of laboratory censorship known; and not a single article is marketed until it is proven by actual tests to work in harmony with the other Radisco instruments of quality in "Radio-Co-operation."

The latest triumph to be released from the Radisco Laboratories is the

Radisco Coupler

Specially designed for use with the No. 1 Variometer

The stationary winding consists of 37 turns in groups of six turns and single turns. Strength and high insulation insured by use of Bakelite tubing. Brass bearings support thoroughly seasoned wooden ball; Brass shaft of standard size to fit the No. 67 Corwin dial projects far enough for Coupler to be readily mounted. The whole instrument is finished off on a neatly varnished wooden base.

No. 2 Coupler (as illustrated) \$8.50

No. 2D Coupler with "dial" \$9.75

Shipping weight 3 pounds



The agents listed below carry all Radisco products and they will be glad to consult with you on the new Radisco Coupler

ALBANY, N. Y.
Shotton Radio Mfg. Co.,
8 Market St.

ASHEVILLE, N. C.
Hi-Grade Wireless Instrument Co.

ATLANTIC CITY, N. J.
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118 So. New Jersey Ave.

BALTIMORE, MD.
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Chicago Radio Laboratories,
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KANSAS CITY, MO.
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If none of the above agencies are in your vicinity, or do not give you the desired information on Radisco Apparatus, communicate with

RADIO DISTRIBUTING COMPANY : : Newark, New Jersey

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

-and here it is-

You have asked for it. You have looked for it. You have hoped for it. And here it is—a transmitting tube for telephone and telegraph C-W transmission, built right up to British and to French Government specifications, including the SHAW standard four prong base.

The plate is nickel, a special molybdenum grid is provided, and the high vacuum permits operation on plate potentials of 500 volts without breakdown. Capacity is about 12.5 watts, and any number may be used in parallel—four make telephone conversation possible over 25 miles, telegraph signals over 50 miles.

Adopted by De Forest Radio Co. as the standard transmitting tube in all De Forest sets of less than $\frac{1}{2}$ k. w. capacity. Licensed under the De Forest Audion and Fleming patents. Other patents applied for and pending.

PRICE \$7.50
ORDER FROM
YOUR DEALER

WRITE FOR DESCRIPTIVE PAMPHLET

PACIFIC RADIO SUPPLIES CO.
638 Mission Street San Francisco, Cal.
ATLANTIC RADIO SUPPLIES CO.
8 Kirk Place Newark, N. J.

Distributors for Moorhead Laboratories, Inc.,
Manufacturers of



A-P Transmitting Tube

To be used only in apparatus manufactured by De Forest Radio

Tel. & Tel. Co.

E. J. Cunningham

announces

THE IDEAL AMATEUR TUBE
in this new
AudioTron Detector Type C-300
WITH STANDARD FOUR PRONG BASE



**Insist on Type
C-300
\$5.00**

Cunningham tubes are covered by patents dated 11-7-05, 1-15-07, 2-18-08, and others issued and pending. Licensed only for amateur or experimental uses in radio communication. Any other use will be an infringement.

TYPE C-300 possesses combination properties—it functions as a highly sensitive spark detector, an Audio-Frequency Amplifier, an Oscillator for regenerative amplification and C W reception, a radio-phone detector and amplifier—with the added advantages of low B Battery (18-22½ volts) ease and permanency of adjustment, uniformity and quietness.

Type C-300 is produced by an entirely new process of manufacture. Gas action must be coupled with electron emission for high signal audibility and sensitiveness as a detector. In the past it has been impossible to control this necessary gas content during manufacture and also obtain uniformity. Put Type C-300 to the test as we have in comparison with all previous types of tubes. I am confident of your answer.

Produced in large quantities entirely by machinery in the largest vacuum tube factory in the world has made it possible to offer Type C-300 at the remarkable price of \$5.00. Every tube is carefully inspected and tested and is guaranteed free of all mechanical and electrical defects.

Cunningham Type C 301 High Vacuum Amplifier

is designed to meet the demand for the Navy Type amplifier and regenerative receiver. The internal structure and exhaust permit operation at plate voltages of 40 to 100. Amplification constant 7 to 9 with internal impedance of 20,000 to 12,000 ohms. Price **\$6.50**

SEE YOUR DEALER TODAY and get your copy of Bulletin C-300 describing these new tubes. If your dealer cannot supply you send us his name and address and we will mail you a copy without charge.

Service and Quality since 1915 Guaranteed by

Dealers - Jobbers

You will be interested in my proposition on the new tubes with the standard four prong base, packed in attractive individual cartons. DELIVERIES FOR 60 DAYS NECESSARILY IN ROTATION. Write today for full details.

E. J. Cunningham

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AUDIOTRON MFG. COMPANY

35 MONTGOMERY ST., DEPT. N

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SEND FOR OUR CATALOG

Ask Your Dealer To Show You Our Goods

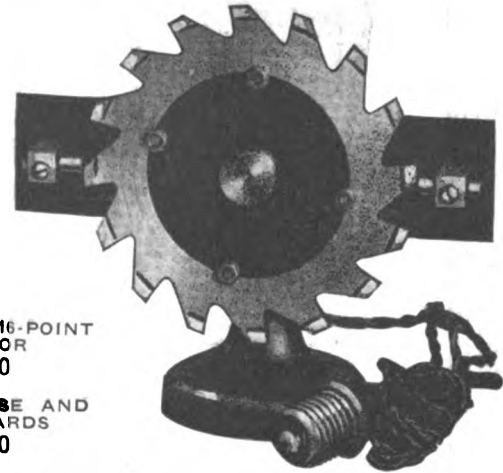
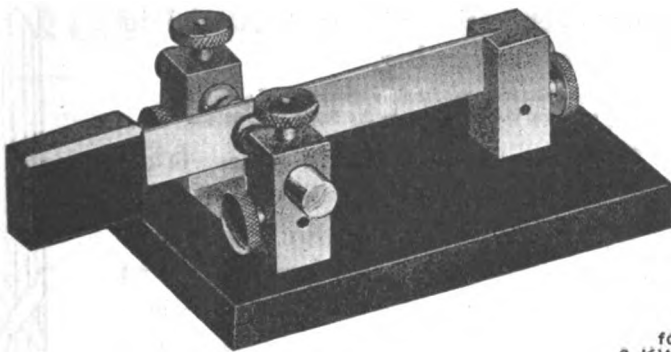


MANUFACTURERS—JOBBER—RETAILERS

ROTARY GAP No. YM-1

A new development in the rotary line has been made expressly for Young & McCombs. Improvements on the well-known saw tooth rotary wheel make this gap the equal in tone and efficiency to any selling for twice the money. It is the only gap on the market which will run smoothly and reliably in either a horizontal or vertical position. Can be run in a vertical position while screwed to the wall. Rotor is machined cast aluminum with formica center. Has liberal sparking space and is drilled for either $\frac{1}{4}$ or $\frac{3}{16}$ shaft. Variable motor speed switch in base.

PRICE—Completely Assembled—\$16.00



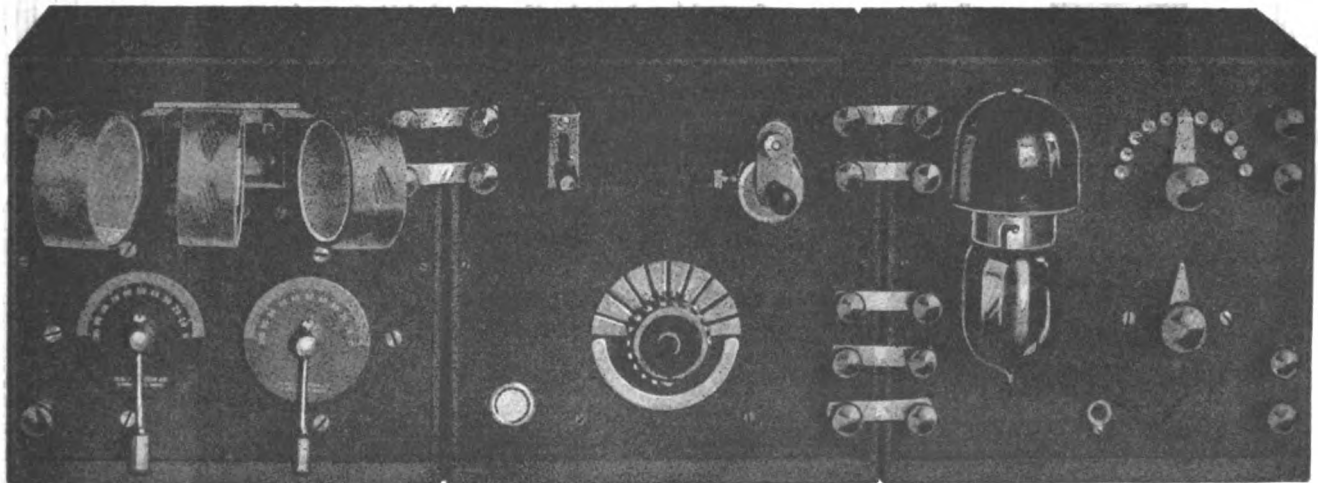
SAW-TOOTH 16-POINT
ROTOR
\$4.50

ROTOR BASE AND
STANDARDS
\$7.00

"COOTIE" KEY No. YM-6

The "Cootie" key is the snapiest sending device offered on the market for reliable spacing of characters. Large standards, formica knob, substantial silver contacts suitable for use up to 2 KW. The double action of the "Cootie" key lends an individuality to your sending. Price, Nickel-plated \$5.00.

UNIT SECTIONAL CABINET RECEIVERS



YM-7b

YM-9

YM-4a

A typical unit sectional cabinet receiver is here shown. We are the sole originators and designers of this type of receiver. Cabinets are of quarter sawed oak with "Early English" finish. Bakelite panels. Audion cabinet contains 60 volt variable "B" battery. This set, with proper honeycomb coils, is operative from 150 to 20,000 meters. Amplifiers may be added to these sets in any number. The crystal detector cabinet includes an enclosed buzzer and battery. All instruments can be supplied separately or in complete sets.

TUNERS	CRYSTAL DETECTOR	DETECTORS-AMPLIFIERS
YM-7b—With plain mount.....\$29.50 YM-7a—With geared mount..... 32.50 (Less Coils)	YM-9 Complete with test buzzer and battery .....\$24.50	YM-4a Detector .....\$25.00 YM-5a Amplifier 31.00 (Less Bulbs)

WESTERN REPRESENTATIVE—LEO. J. MEYBERG CO., SAN FRANCISCO, CALIF.

When writing to Advertisers please mention this Magazine

RADIOTRONS VACUUM TUBES *for* Amateur or Experimental Use

THE facilities and resources of the world-famous RESEARCH LABORATORIES of the General Electric Company have been concentrated upon the development and design of a new series of VACUUM TUBES for Radio Detection and Amplification. The RADIO CORPORATION OF AMERICA now offers to the Wireless Experimenter two distinct types, each adapted to a particular field of usage.



LIST PRICE
\$5.00



LIST PRICE
\$6.50



Standard Grid Leak

A complete line of vacuum tube ACCESSORIES are now in manufacture and will shortly be available.

Dealers and Jobbers: We have an especially attractive proposition for you. Write us at once.

RADIOTRON U. V. 200, the first of the series, is a Detector and Audio Frequency Amplifier of unusual capabilities, which operates from a single standard plate battery. Best detector action occurs at plate voltages between 18 and 22½ volts, with a filament current of approximately 1 ampere, and with a grid condenser and grid leak. U. V. 200 is particularly adapted to amateur regenerative circuits. A trial in such circuits will be the most convincing.

NOTE—A special "A" or filament battery potentiometer for close adjustment of the plate voltage of U. V. 200 will shortly be placed on the market by the Radio Corporation.

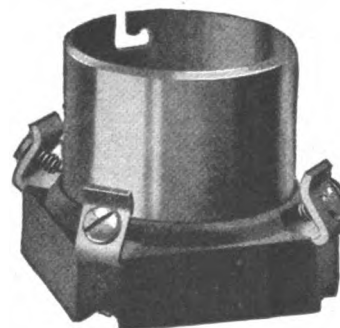
RADIOTRON U. V. 201, the second of the series, is an unexcelled Amplifier of the PLIOTRON type, which may be used for Detection and for Radio or Audio Frequency Amplification. Normal plate voltage, 40 (two standard "B" batteries). Voltages up to 100 may be used on the plate with increasing amplification. Amplification constant, 6.5 to 8 at 40 volts on the plate, 8 to 10 at 100 volts on the plate.

Note to Amateurs, Dealers and Jobbers

Radiotrons are manufactured by ultra-scientific methods laid down by America's foremost tube experts. No guess work—each tube bears the stamp of electrical manufacturers of world-wide reputation. A uniform product is assured. All tubes fitted with standard four-prong base. Filaments operate from 6 volt battery with rheostat.

LIST PRICES

Radiotron U. V. 200	\$5.00
Radiotron U. V. 201	6.50
Standard Vacuum Tube Socket	1.00
Standard Grid Leak-Mounted	
100,000 ohms to 6 megohms	1.25
Grid Leak Unit	.75
Grid Leak Mounting	.50
Audio Frequency Transformer	7.50



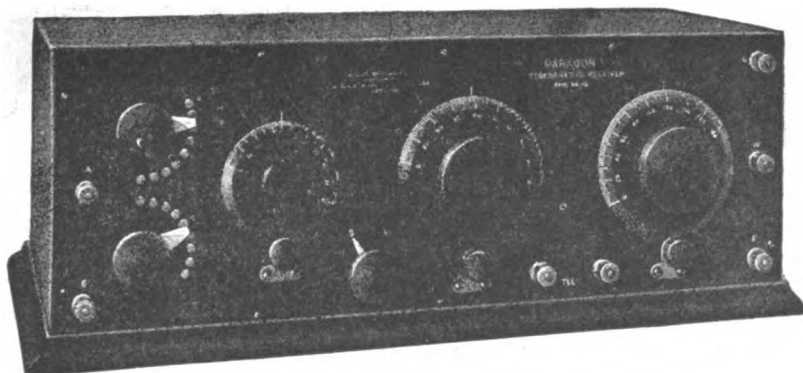
Standard Vacuum Tube Socket

The Radio Corporation's tubes are covered by patents dated November 7th, 1905, January 15th, 1907, and February 18th, 1908, as well as by other patents issued and pending. Tubes licensed for amateur and experimental use only. Any other use will constitute an infringement.

Address all orders and enquiries to
SALES DIVISION

COMMERCIAL DEPARTMENT, Radio Corporation of America
233 Broadway, New York City

PARAGON RA-TEN



Licensed under Armstrong and Marconi Patent, 1,113,149.

**Amplifying
Short Wave
Receiver**

You'll Hear Stations You Never Heard Before

Just a Word About Our Mail Order Service

For out-of-town amateurs, we maintain the same standard of personal service in our Mail Order Department. Your order will be accurately filled and shipped within forty-eight hours. Twenty-five cents brings our 112 page catalog. We list a few different instruments below; see other current radio publications for a more complete listing.

AUDION CONTROL UNITS

Radio Craft Detector Unit	\$15.00
Radio Craft Detector and 1-Stage	50.00
Radio Craft Detector and 2-Stage	70.00
Radio Craft, 2-Stage	50.00
RORA Grebe Unit	12.50
RORH Grebe Unit (with batteries)	17.50
RORE Grebe 1-Stage Amp.	25.00
RORJ Grebe 2-Stage Amp.	50.00
RORG Grebe Det. and 1-Stage	47.00
RORD Grebe Det. and 2-Stage	75.00
P-400 De Forest Unit	12.00
P-401 De Forest Unit with cabinet	14.75
P-402 De Forest Unit with 40V battery	22.00
P-500 De Forest Audion, Ultra Audion	
with 40 volt battery	25.00
P-200 De Forest 2-Stage Amp. with 40-volt battery	70.50

RHEOSTATS

No. 2110 Porcelain Base	1.40
Paragon back mounted	1.75
G. R. back mounted	2.50

GRID LEAKS

Marconi complete with holder and leak	1.00
No. ROCA Grebe Condenser and leak	1.60
G-100 De Forest Variable leak .....	.75

ANTENNA SWITCHES

No. 463 Murdock	4.50
F-658 Clapp-Eastham	12.50

**Our Word of Honor Is Our Guarantee
Let Us Prove It**

—With This New Paragon!

THE PARAGON R. A. Ten covers amateur, commercial and navy wave-lengths. Advanced engineering design, combined with superior insulation and accurate controls, enables you to hear the weak station plainly and with proper selectivity, **THAT ONE STATION ONLY.** Here are a few outstanding features:

Wave length, 160 to 1000 meters
Amplification, 100 times
No dead end losses whatever
Vernier attachments on all controls.

The original R. A. 6 was the acknowledged superior of any other set on the market. This NEW triumph of Adams Morgan Co. is as far ahead of the R. A. 6 as that was ahead of all others.

All amplification is obtained without change of spark tone. Objectionable effect of change of note is entirely eliminated. Coupling has scale of 180 degrees.

The cabinet is of quartered oak; overall size 20 5-8 inches by 8 inches by 7 1-2 inches. Fitted with genuine Bakelite panel, knobs and dials. White filled engravings. Truly an instrument to be proud of.

Every set sealed and guaranteed for two years.

PRICE EIGHTY-FIVE DOLLARS

Send for our Special Bulletin on the Paragon R. A. Ten. Interesting and complete. Drop post card today.

Continental Radio and Electric Corp.

Sole Distributors of the Paragon RA-TEN

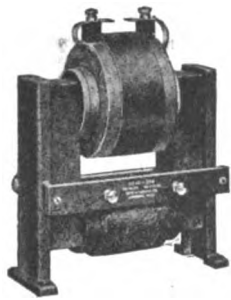
J. DI BLASI, Secretary

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6 WARREN STREET

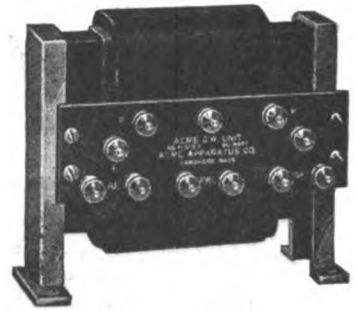
J. STANLEY, Treasurer

NEW YORK



Power factor 95 cent

Acme Apparatus

500 volts D. C.
350 volts D. C.

SPARK TRANSFORMERS
C. W. POWER TRANSFORMERS
MODULATION TRANSFORMERS
FILAMENT HEATING TRANS-
FORMERS

AMPLIFYING TRANSFORMERS
SPECIAL TRANSFORMERS
AMPLIFIERS
DETECTORS
CHOKE COILS

The ACME SPARK TRANSFORMERS have the highest efficiency, highest power factor, highest spark frequency and lowest price of any on the market.

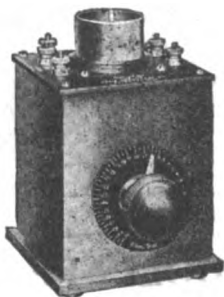
The ACME C. W. POWER TRANSFORMERS are for use with rectifying tubes for supplying high voltage direct current and for lighting filaments.

The ACME MODULATION TRANSFORMERS are essential for large power tubes.

The ACME AMPLIFYING TRANSFORMERS are the result of experiments by transformer engineers. Correst ratio and impedance.

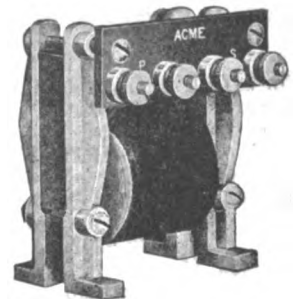
The ACME AMPLIFIER and ACME DETECTOR contain in a small space what so often required considerably more.

The ACME CHOKE COILS are 1 1-2 Henries for use in C. W. power circuits.

Small Enough For
A Xmas Stocking

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Western Radio Elec. Co., Los Angeles.
Leo. J. Meyberg, San Francisco, Cal.
Radio Shop, San Jose, Cal.
Wireless Shop, Los Angeles, Cal.
Meteor Elec. Co., Los Angeles, Cal.
Northwest Radio Service Co., Seattle,
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Small Enough For
A Xmas Stocking

Acme Apparatus Company 21 WINDSOR STREET,
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TRANSFORMER AND RADIO ENGINEERS AND MANUFACTURERS

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Let these Tubes Enlighten Your Station on Christmas Eve

A SUGGESTION
What better gift could you give your radio friend than a vacuum tube and a subscription to "Pacific Radio News?"

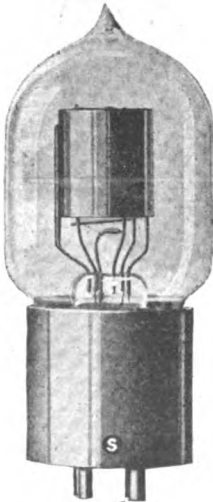
We are going to give them to you **FREE** of charge. Read this wonderful Christmas offer!

OFFER NUMBER 1—THE A. P. V. T. TUBE

Given free with a four year subscription to "Pacific Radio News." Specify whether an Oscillator, Amplifier or Detector tube is desired. Add 25c for mailing charges. These tubes sell for \$6.00 and \$7.00. They are genuine and guaranteed by the manufacturer.

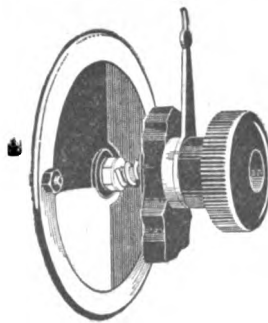
OFFER NUMBER 2—THE NEW CUNNINGHAM AUDIO-TRON TUBE

Given free with a four year subscription to "Pacific Radio News." The regular price of this tube is \$5.00. Add 25c for mailing charges. All tubes are genuine and guaranteed by the manufacturer.



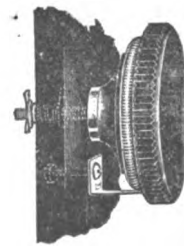
OFFER NUMBER 4—THE NEW PARKIN .001 PANEL MOUNTING VARIABLE CONDENSER

Given free with a two year subscription to "Pacific Radio News." Add 10c for mailing charges.



OFFER NUMBER 5 — THE PARKIN PANEL RHEOSTAT FOR PANEL MOUNTING.

Given free with a one year subscription to "Pacific Radio News." Add 10c for mailing.



OFFER NUMBER 3—THE NEW A. P. TRANSMITTER TUBE. Will carry 12.5 watts.

Given free with a five year subscription to "Pacific Radio News." All tubes are guaranteed by the manufacturer. Regular price \$7.50. Add 25c for mailing charges.



OFFER NUMBER 6—THE PEN BRAND GRID CONDENSER

Constructed of Bakelite and Mica with



copper foil. Regular price \$1.00. Given free with a one year subscription to "Pacific Radio News." Add 10c for mailing charges.

Important! These premiums will be awarded on extensions, new subscriptions, or to those who desire to secure subscriptions from individuals.

PACIFIC RADIO PUB. CO.,
 50 Main St., San Francisco, Cal.

Herewith is \$..... andcents for mailing charges. Please send the apparatus described in offer number and "Pacific Radio News" foryears to:

Name

Address

Make it a Radio Christmas!

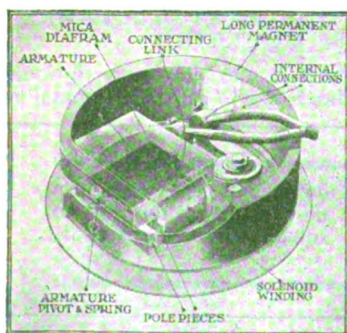


Now Dad - Hear the tenor

"I can listen in on all the radio concerts now, Dad. Those Baldwin phones you bought me for Christmas are corks. Just listen to that famous tenor singing over the wireless telephone. Every note records just as clearly as though it were a phonographic reproduction right here in our own home."

Actually Baldy Phones reproduce in identically the same manner as do the high grade phonographs. Instead of a heavy iron diaphragm, as in most phones, a selected grade of mica is used. This is much more susceptible to distortion and as a result responds more readily to the thousands of overtones and harmonics of the human voice or any musical instrument.

Baldy's are the most sensitive phones in the world. This is attested to by the fact that the leading radio engineers, with every facility at their command for testing the audibility and sensitiveness of every make of phone, choose Baldwin for their personal use.



Study this X-Ray photo of a Baldwin ear-piece and you will see why they are world famed for their sensitiveness.

Our new booklet will give you some interesting facts about Baldwin Phones, in addition to prices. Ask your dealer for a copy. If he can not supply you write direct, giving his name and address.

JOHN FIRTH & CO., Inc.

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BALDY

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LAND
SEA
AND IN THE
AIR**

PHONES



PACIFIC RADIO NEWS





PAUL R. FENNER
Editor

H. W. DICKOW
Advertising Manager
50 Main St., S. F., Cal.

January issue forms
close on December 1.

RADIOTORIAL

BY THE EDITOR

PUBLISHED MONTHLY

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the U. S.
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Countries

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Pacific Radio Pub. Co.

TO ALL RADIO MEN, THOSE WHO WILL UNDERSTAND

CHRISTMAS is here. Merry Christmas. Peace, Good Will, Happiness and Contentment for all is abundant. One Christmas has passed since the great world war, but it has not been till this Christmas that all the boys have returned home, become settled and ready to appreciate all that Christmas means.

There is something about Christmas that brings cheer to the saddest heart, and if it does not, isn't there something wrong? Aren't there some of us, who, somehow or other, are never at rest without just decrying about this or that being wrong? What's the trouble? No resonance! YOU, who are not happy this Christmas, or rather, think you are not, just take a look at your hot wire meter, first, and see if the needle isn't waltzing with the ZERO mark. But don't waste time looking at the ammeter. Start in cleaning house. Don't just fix up the condenser with new connections, don't sandpaper your spark gap points, or just re-wire the old "junk heap." Build yourself a house on a stone foundation, as the parable says. Tear everything out, and build anew.

Resign your membership in the Inefficient Club; join the American Society of Efficientists. And remember this, men, there are no different grades of membership—all are the same—just plain MEMBER. A man in the One Inch Coil class rates as high as the man in the One Kilowatt Transformer class, just as does the Galena expert rank with the Vacuum Tube hound. So don't "bellyache" about not being able to join.

Now that you are a member, keep this in mind: your source of current supply is UNLIMITED. You can have all



you want. Just a word to the wise will be sufficient here; if you have a spark coil use six or eight volts of the unlimited direct current and if you use a transformer use the unlimited source of alternating current and use the right voltage. Next, but before hooking up your coil or transformer, fix everything

up nicely. Get each and every receiving instrument in tip top shape, discard the ones that are really more of a drag than a help and ask Dad, or Santa Claus, for some new ones if you really need new ones.

Be sure that everything is right, though. Don't work in the dark; remember there is LIGHT. For instance, don't use three No. 19 copper wires for a lead-in to an antenna having four No. 12 wires. That is wrong. **DO THINGS RIGHT; ALWAYS RIGHT.** If there is any point you are in question about remember that you can procure the information without trouble from good books, or write us; we'll tell you.

And when you are ready, tune up. Fix yourself so that you only radiate **PURE WAVES**. Also be sure of your **WAVE LENGTHS** and **SHARPNESS**. Of course, even a Radio Inspector would concede that it is not so necessary to be SHARP in every sense of the word, but you must not be over two hundred meters.

Now we assume that you are ready to send and receive. The next word of caution is this: **SEND WITH WISDOM**. Don't be selfish, don't take it all for yourself; think of others. Send at a speed which is such that each character is perfect, and perfectly spaced.

These words of wisdom have been written from the Unlimited Source of Supply, those who heed will have a very Merry Christmas, those who do not will not fare so well. You may have to read this over again, but you will understand with a little study. Merry Christmas to you, all of you, and think, too, that even static can be eliminated.

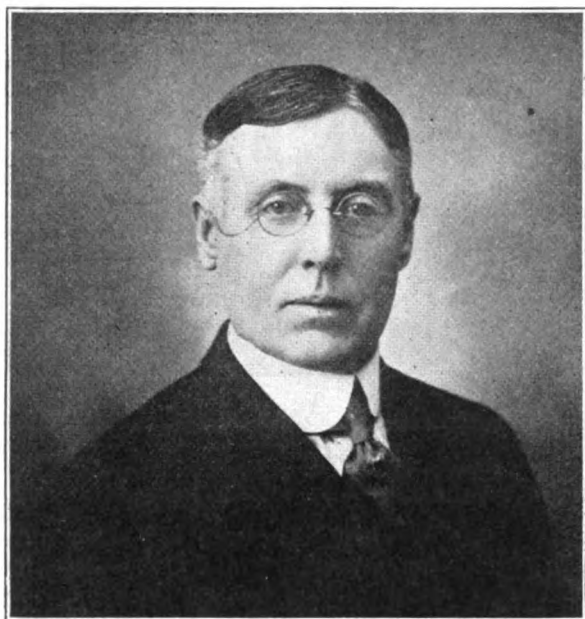
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Boston Office.....18 Boylston St.

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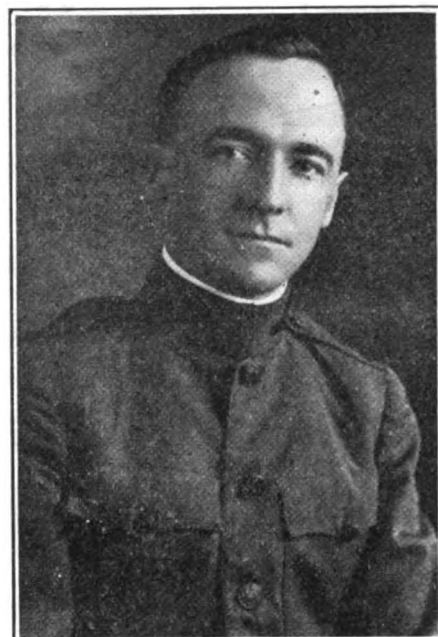
Seattle Office.....419 Pioneer Bldg.
London Office.....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

THE RADIO CONVENTION—A STEPPING STONE TO PROGRESS



LEFT—Major J. F. Dillon, U. S. Radio Inspector of the 6th Radio District. Honorable Chairman of the Convention.



RIGHT—Willard E. Lufkin, Chairman of the Convention Committee, who has full charge of the affair.

Illustrations by J. L. SABO

THE Pacific Radio Convention at San Francisco, California, November 25th, 26th, 27th and 28th, will bring to the attention of the public the magnitude of the radio industry and provide one of the greatest mediums of intercourse between radio men ever held.

Never before has an attempt been made to bring radio men together with the purpose of exchanging ideas, demonstrating the fruit of their efforts, and for enjoying good fellowship in the profession, as in the coming Pacific Radio Convention. Each and every man who is affiliated with the radio industry and who does not come to San Francisco to profit by the convention will miss a rare opportunity of educating himself to future possibilities in the radio field. All

radio men should make it a point to be there, because there is a place waiting for every man in the "game" at San Francisco during the convention.*

THE FIRST CONVENTION MEETING

The first meeting will take place on Thursday morning, November 25th, Thanksgiving Day, at 10 a. m. This meeting will be the opening of the convention and only radio men will be in attendance. It is expected to open the convention with a speech by Mayor Rolph of San Francisco, given by radio telephone from his residence.

Major J. F. Dillon, Radio Inspector for the Sixth Radio District, is the Honorable Chairman of the convention. Nearly every Pacific Coast radio man and many others know Major Dillon as a fine character, a loyal and true friend, and a man unconcerned with petty prejudices which, in this day and time, are so common in radio circles. Major Dillon is one of the men who will make the convention a success.

The Chairman of the convention committees is Mr. Willard E. Lufkin, formerly a lieutenant in the Signal Corps of the United States Army. Mr. Lufkin is responsible for the financial success of the undertaking and has carried out his duties in a manner worthy of the highest commendation. He has been devoting his entire time to the management of the affair, and will be one of the principal figures of the convention. The responsible duties as chairman of the main committee were accepted by him after three former chairmen had declined to carry on the work.

The convention activities will be at 2460 Sutter street, near Divisadero street, in the auditorium of the S. F. Gymnastic Club. Take a No. 1, 2, 4, 24, or Municipal street car direct to the convention. Arrangements have been completed to seat 1000 radio men.

THE SECOND DAY OF THE CONVENTION

On Friday, November 26th at 8 p. m. the most phenomenal and magnificent radio show will open. Amongst the exhibitors will be the following:

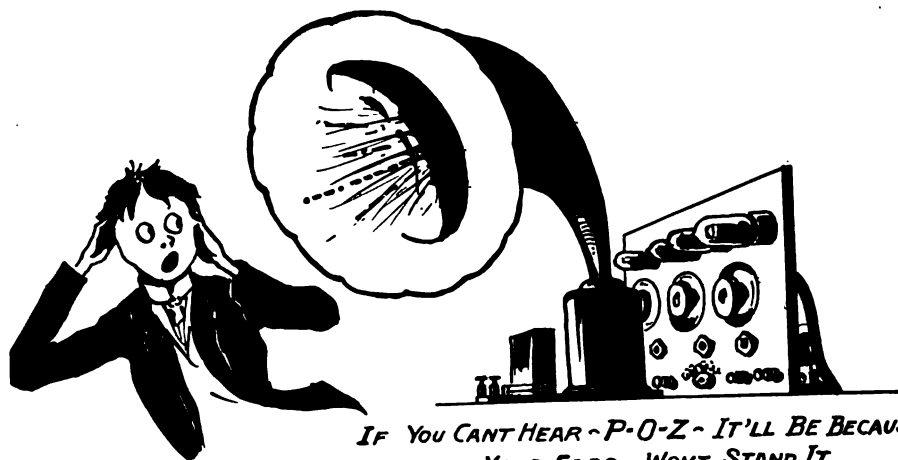
Pacific Radio Supplies Co.
De Forest R. Tel. and Tel. Co.
Leo J. Meyberg Co.
The Colin B. Kennedy Co.



They Will Be Coming From All Over.



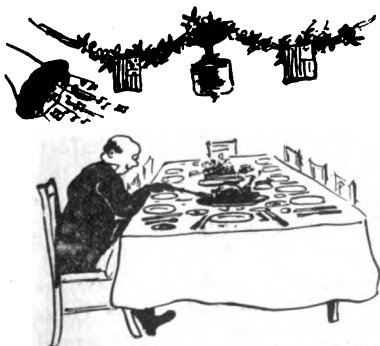
People in the Vicinity Will Know There's Something Doing.



Federal Telegraph Co.
Oard Radio Laboratories.
The Radio Telephone Shop.
Magnavox Co.
Nat. Radio Institute.
Ever Ready Battery Co.
Radio Corp'n. of America.
Army and Navy.
Pacific Radio News.
The Nostat Co.
Calif. Electric Supply Co.
San Francisco Radio Club.
Kilbourne & Clark Mfg. Co.

All radio engineers and operators know the important part taken by these organizations in radio work and development, and will therefore realize that the radio show for the convention will exceed all expectations.

The Federal Telegraph Company will install two complete Poulsen Arc Transmitters and Receivers. The Navy will install a complete radio compass station, to demonstrate to radio men and the general public, how a ship in a dense fog can always ascertain its exact position with this interesting development in radio sets. The Department of Commerce expects to have a booth



THERE'LL BE NO QUESTIONS ABOUT THE INPUT EITHER

fitted up to give examinations for radio operators, first grade commercial, amateur, etc. Manufacturers of loud speaking devices, such as the Magnavox, and of radio telephones, will install apparatus which will surprise and educate many. Even the amateur will be represented. Many complete sets and pieces of apparatus, made by amateurs, will be displayed.

The auditorium, where the show will be held, and the building also, will be decorated with a novel scheme appropriate for the occasion.

The general public is cordially invited



THERE WILL BE SOME ATTRACTION - I'LL SAY!

The show will be open till 11 p. m. Friday, November 26th, Saturday, November 27th, 1 p. m. till 11 p. m., and Sunday, November 28th, 1 p. m. to 11 p. m.

to attend the show, and radio men are requested to bring as many friends as they can, to show them the wonders of wireless.

THE RADIO BANQUET

The Radio Banquet will be given on Friday, November 26th, at 7 p. m. in the banquet hall of the S. F. Gymnastic Club. The proverbial everything "from soup to nuts" will be served, and not only that, but some novel and interesting "stunts" will be shown also. It is expected that over 200 men (radio only) will attend. A good time for all is predicted and radio jokes and speeches will help to digest the dinner.

THE RADIO BALL

The Radio Ball will be a gala event. It will be held in the ball room of the Century Club of San Francisco. The affair will be invitational. The guests will be given an unusual treat in the form of a radio musical surprise. All menfolk will be those who are actively interested in radio. One hundred and twenty-five couples will be invited to attend.

In the January, 1921, issue of Pacific Radio News there will be a full account of the proceedings of the Pacific Coast Radio Convention.

*If you are unable to attend, under any circumstances, the convention will be brought to you by PACIFIC RADIO NEWS. Send for a free copy of the January number.

BORDEAUX RADIO STATION SUCCESSFUL

The mammoth radio station at Bordeaux, France, for which the parts were manufactured in the plant of the Federal Telegraph Company at Palo Alto, and which were installed and tested by representatives of the local concern, has passed all tests satisfactorily and is now being operated by the French government, according to information received by Haradan Pratt, acting chief engineer of the Palo Alto plant, from Chief Engineer R. R. Beal and J. A. Miller, both of the Federal Company, who are still in France observing the operation of the station.

Considering the fact that the Bordeaux station is the largest ever built, it is interesting to the engineering world to know that in the entire thirty-day period of tests the station operated with perfect success without a single break or interruption, and it was never necessary at any time to make any changes or modifications of magnitude, so that the engineers from the Palo Alto factory were able to leave the station in the hands of the French operators after the tests were completed.

During the testing period, the French operators and engineers were trained to operate the station, and have been able to do so without any further assistance from the installing crew.

Signals from the Bordeaux station were observed by other radio stations scattered over the world, including those of the United States navy in the Hawaiian Islands and the Philippine Islands. Reports received at the Palo Alto plant since the completion of the tests indicate that good, clear signals were obtained on all occasions. According to officials at the local factory, the Bordeaux project has more than fulfilled the highest expectations of the builders.

Characteristic of Bordeaux Station

The equipment for the Bordeaux station was designed and built in the Federal Telegraph Company's factory here in 1918 and the installation was made in France for war purposes by the United States Navy Department, which contracted with the Palo Alto company for the equipment. The government of France provided the foundations and buildings for the project. The apparatus is contained in a large power house and the overhead antennae network of copper wires is held in place by eight self-supporting steel towers covering an area of 4000 by 1400 feet. The towers are 820 feet high and weigh 550 tons each. They are the largest and best erected of any radio station in the world.

The magnitude of the Bordeaux station

may be realized when it is noted that the antennae structure is nearly one mile long.

Power to operate the station is obtained from the City of Bordeaux over a transmission line, and when operating at full power from 1000 to 1200 kilowatts of energy are necessary continuously.

Another unique feature of the station is the unusual length of the electric waves it produces. The longest wave lengths used for radio communications previously have been those employed at the naval radio station at Annapolis, Md., the equipment for which was built in Palo Alto. The Annapolis station uses a wave length of little over a mile long. The Bordeaux station, during its tests, used a wave length almost one and one-half miles long. These enormous wave lengths permitting the waves to travel for long distances have been one of the features of the performances of the Bordeaux station.

Better Service Than Cables

The field for wireless development is considered by the radio experts to be extremely promising since wireless communication presents advantages over the cable line system, being able to give better service than cables and not involving the heavy cost of cable building and cable ship maintenance.—Palo Alto "Times."

Results of Honolulu Test To Be Announced at Convention

ON SATURDAY and Sunday, November 20th and 21st, at midnight, Honolulu time, the Hawaiian Transmitting Contest will take place. Dozens of applications to partake of the test have been received of late, but it has been necessary to limit the number of contestants to fifteen in order to avoid confusion and delay.

A radiogram bearing the date of October 26th has been received from Mr. M. A. Mulrony, expert radio aide at the Pearl Harbor Naval Station, reading as follows:

"Tests arranged November twenty-first; letter follows."

Another radiogram received the same day from Mr. T. Hall states that the test will be held on the 20th and 21st at midnight, Honolulu time, and the fullest co-operation is guaranteed.

As we go to press we are still without written word from Mr. Mulrony, probably due to delays in the mail. A letter from Mr. Hall dated November 1st is at hand and he has this to say:

"I suppose you received my radio in reference to the test. I saw Mulrony and he states that he has written you. I am moving my receiver to the College of Hawaii as the induction in the business section of Honolulu is fierce.

"I will get the schedule from Mulrony this week and have wired 6EA to call me independently on the evening of the 20th and 21st as I know that I can get him.

"I will send our station log for publication in the 'Pacific Radio News'—provided that we hear anything. Let's hope for the best."

The following stations have been entered for the test:

D. B. McGown (6ZE), San Francisco (C. W.).

Hall Berringer (6BJ), Burlingame, Cal. (Spark).

A. E. Bessey, Sunnyvale, Cal. (6ZK) (Spark).

H. R. Shaw (6BN), San Francisco (Spark).

Seefred Bros., Los Angeles, Cal. (6EA) (Spark).

M. H. Finley (6PQ), Santa Ana, Cal. (Spark).

G. Arnold (6AT), San Jose, Cal. (Spark).

R. Mumford (7CU), Vancouver, Wash. (Spark).

Wm. Wood (6KL), Oakland, Cal. (Spark).

L. D. Mealer (6AK), Walnut Grove, Cal. (Spark).

J. V. Wise (6EJ), Walnut Grove, Cal. (Spark).

M. S. Jackson (6JI), (Spark).

L. Van Gorder (6OC), San Francisco (Spark).

L. F. Aufdenkamp (6SK), Laguna Beach, Cal. (Spark).

E. M. Sargent (6ZA), California Theater, San Francisco (Spark and C. W.).

The schedule for the test has been transmitted by radio from stations 6BN and 6ZE, and the contestants have been supplied with further instructions by mail. The time for the test is 3 a. m., San Francisco time, on both occasions.

The results of the contest will be announced at the opening session of the Pacific Coast Radio Convention and the winners will receive prizes on that day. The De Forest radiophone in the California Theater has also been entered for the test. The equipment is being recommissioned and every effort will be made to reach Honolulu on the buzzer and bulb. Mr. D. B. McGown expects to have a tube set in operation, and 6BN is burning midnight oil with the object of finishing his new installation several days before the contest is called. Further details will be published in our next issue.

RADIO DEVELOPMENT & STANDARDIZATION

THE AMRAD GAP

MUCH has been said pro and con rotary gaps and quenched gaps. Both gaps have been found to be good gaps, but the quenched gap has certain inherent advantages about which there seems to be considerable foggy knowledge. Briefly, the quenched gap causes the transmitter to radiate maximum energy on a single wave length reducing interference and increasing range. Further, the quenched gap is practically silent in operation even when operating at full power.

More in detail, a rapid quenching action quickly stops further discharge of the transmitting condenser after the first and most powerful oscillations have passed. Thus, the induced energy is concentrated entirely on the antenna allowing it to radiate on a single sharp wave length and preventing a wasteful re-transfer of energy back into the primary oscillating circuit, a condition almost inevitable wherever ordinary plain or rotary gaps are used.

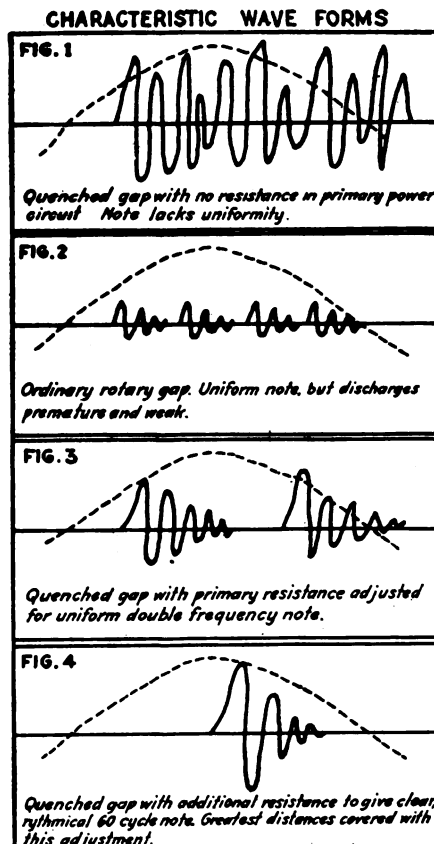
A properly designed quench gap therefore allows closer coupling. This insures a greater percentage of available energy actually put into the antenna and substantial increase in transmitting range. Moreover, the emitted wave conforms to Federal regulations respecting decrement. With a strict enforcement of the Federal regulations and the great increase of interference between stations operating on amateur wavelengths the properly designed quenched gap offers the most ready solution to a serious problem.

It has been said that a quenched gap operates best with 500 cycle current. This is not in accordance with the facts. Frequency does not affect the efficiency of the gap itself. In the case of 200 meter operation 60 cycle current is much more desirable since the slower period permits a saturated condenser charge before each train of oscillations takes place. The question has been asked whether it is possible to obtain a good spark note with 60 cycle current. The answer is "yes." A clear rythmical note of either 60 cycles or 120 cycles frequency may be obtained by adjusting the number of gaps in circuit and the value of resistance in series with the a. c. transformer primary.

Some quenched gap sets produce a "mushy" note because the operator fails to use sufficient resistance in the primary power circuit. This causes the spark to "arc" in the gap, producing the "mushy" note. The importance of using sufficient resistance in the primary power circuit does not seem to be fully appreciated by a few operators. Figs. 1, 3 and 4 emphasize this point. Fig. 2 shows the characteristic wave form of the ordinary rotary gap.

No special knowledge is required for the operation of a quenched gap. Explicit in-

structions are included with most of the better types on the market and the operator simply needs follow these. As regards upkeep, the quenched gap has a long life for everyday use—not abuse. It is neither liable to wear out or break provided the ordinary operating instructions are followed.



THE STANDARDIZATION OF APPARATUS DESIGN

A discussion of the possibilities of standardization and its bearing on experimental radio equipment

By K. H. Stark*

WHEN a company is organized to manufacture radio equipment, or when an existing organization takes up this work, much time and money must be spent in the preliminary design of the apparatus to be sold. Once in production, any change is very expensive. Then, if it is found necessary to discontinue the manufacture of an instrument, unused special parts lay a heavy toll on the profits realized on other apparatus.

Shortly after the armistice, plans were laid for the organization of The General Apparatus Company, Inc. Before a single instrument ever went to the shop, or before there was any shop, the entire development of radio apparatus design was carefully reviewed, and, at the same time, a careful

study was made of the ideas of experimenters and their peculiar requirements.

Development of Apparatus Design

A brief resume of the methods employed by various manufacturers in this country and Europe, leading up to the present practice, is of interest.

Back, in what some of us like to call the "early days" a radio installation was hardly more than a laboratory set-up, for each instrument was an experiment in itself. The result would not now be called a receiver or a transmitter.

As time went on, instruments were developed which operated with some degree of dependability. They were fitted together on whatever kind of framework suited the ideas of the designer. These methods sufficed for a number of years. No protection was afforded to the equipment against dust and dampness. It was at this stage that the first experimental radio equipment was brought out. An amateur station was then a collection of instruments, screwed to the table or sliding around loosely, and connected by an indiscriminate net work of wires.

Probably the first enclosed receivers were those of the Marconi Company, made on horizontal panels. Adjustments protruded from all sides as well as from the top. Many credit the Emil J. Simon Company with the first vertical panel transmitter. One of the earliest vertical panel receivers was used on a U. S. Army field set.

By the first of 17917, practically all commercial companies had adopted this practice. Some experimenters were making their sets that way, too, and three or four manufacturers of amateur equipment had fallen in line.

In 1918 a new departure was seen in radio equipment. An English airplane set and a trench outfit were sent to the United States. The sets were divided into units, connected by plug and cord systems. Here was something new, but not the ultimate refinement.

Finally, at the time the G. A. Company was organized, Mr. M. B. Sleeper, who was consulted about the problem which we were attempting to solve, worked out what we now call the "five by five" system of design, better known among experimenters as the G. A. Standardized Construction.

Before going into details of this method and other points of standardization, an analysis will be given of the experimenters' ideas regarding apparatus design, collected through correspondence and conversations with many of the most active men and boys in radio work.

What Experimenters Want

To catalog for a report the ideas of experimenters on apparatus design would be as difficult as to write a book on the political opinion of the American people. No two

(Continued on page 140)

*Sales Mgr., General Apparatus Co., Inc.

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARD

JAPANESE wireless interference and port discrimination against American steamers and passengers is declared to be working a hardship for Americans in the Orient, according to officers of the American steamer Ecuador, which arrived here recently from the Far East.

C. E. Dixon and R. Thornberg, wireless operators of the Ecuador, declared they find it nearly impossible to send messages ashore to Yokohama or Kobe when nearing the Japanese ports. They state their calls for recognition go unanswered by the Japanese operators, who insist in breaking their messages when communicating with other American vessels.

"I shudder to think what Japanese wireless operators would do if an American steamer in the Orient should send radio calls for assistance. Their tactics are detrimental to commerce and to safety," declared Thornberg. "They seem to take delight in garbling our messages and holding up our calls from one to four days.

"Two American girls, before arriving at Yokohama, sent a wireless ashore to a friend, in which they mentioned the name of a song. Because of the peculiarity of the song's title the Japanese Secret Service thought it was an American spy code. When the two girls arrived at their hotel they were subjected to third degree examinations while a squad of Japanese soldiers stood guard outside their hotel door."—San Francisco "Examiner."

ANOTHER record for the radio station at St. Martin's College, Lacey, Wash., was made Sept. 22. Signals from the college station were picked up by H. Paul Willis at Wichita, Kan., a distance of more than 1500 miles. Mail advices just received by the college told of the remarkable performance.

THE Shipping Board has renewed its annual contract with three radio companies, officials stated. The companies involved are the Radio Corporation of America, the Shipowners' Radio Service, and the Independent Wireless Telegraph Service.

Under the agreement which has been renewed these companies undertake to maintain the radio apparatus on the 1200 vessels owned by the board in good working order. For this they are paid \$30 a month, making a total for the fleet of \$432,000 a year. The new contracts extend for one year from October 1. The radio equipment is owned by the board and the services of the companies are to maintain it in efficient order.—S. F. "Commercial News."

AN aerial torpedo, which carries no crew, but which may be controlled hundreds of miles away by wireless, has been perfected by Charles S. Price, a prominent British aeronautical engineer.

The extraordinary craft has been successfully tested and is said to have attained speeds greater than the fastest airplane. By means of a number of delicate electrical devices, the controller of the machine is able to determine its exact location at any time during flight. The inventor has been able to use it for photography, although with uncertain results.—L. A. "Examiner."

AN agreement is reported to have been reached on the subject of the future of the great German wireless station at Eilwese, Hanover, between the German High Frequency Company and the French claimants. The Telefunken Gesellschaft also is interested in this settlement.

By its terms the French company is to be compensated by money payment, and is to be given the right to use certain German patents abroad which were in dispute. Eilwese is to be turned into a German limited company, in which the German High Frequency Company and the Telefunken Gesellschaft are shareholders. The station, which played a large part in German propaganda during the war, is to be devoted to transoceanic wireless service.

The French Compagnie Generale de Telegraphie sans Fil claimed the Eilwese station as its property on the ground that the German High Frequency Company ceded to it in 1912 the right to take the station over by December 31, 1914, and that this right had now been revived under the peace treaty.—London "Times."

THE station and operator licenses of Chas. Wilson (6LE), 3040 Benvenue street, Berkeley, Cal., have been suspended for an indefinite period by the radio inspector of the San Francisco district. Wilson was accused of sending on a wavelength of 410 meters which resulted in causing interference with commercial traffic.

WHAT is said to be the longest conversation on record, although of few words, is reported by the Bell Telephone Company in a direct communication from a ship 200 miles out on the Atlantic to the phone station on Catalina Island.

Chief Radio Operator S. W. Mitchell, of the steamer Gloucester talked by radio phone to the land telephone sta-

tion at Philadelphia, where his message was received by the land lines without relay and conveyed direct to Long Beach by way of New York, Pittsburg, Chicago, Omaha, Denver, Sacramento, Fresno and Los Angeles. At Long Beach the radio telephone to Catalina Island caught up the message without relay and carried it direct to the island station, where it was received by Chief Radio Operator E. E. Spicer at Avalon. The total distance is 4100 miles, almost one-sixth the circumference of the globe. Several amateur radio operators in Los Angeles listened in on the message and caught it with full clearness.—L. A. "Express."

A 3 K. W. Radiophone set has been installed in the stock exchange at Amsterdam, Holland. It is expected that communication with the United States will be established from this station during the evening hours.

THE International Radio Telegraph Company announces that it opened its coast radio station at Siasconset, Nantucket Island, Mass., radio call WSC, on October 13th.

As is well known to all old radio men, this island has long been the location of commercial and naval stations and because of its particularly advantageous location will undoubtedly be very generally used by incoming European ships in getting off their traffic on long waves and at long range.

The station tax is 12 cents per word.

The station is now equipped to receive long waves, damped or undamped, with heterodyne reception and for the present will utilize spark transmitters, but general enlargements are now contemplated.

Experienced operators will be provided and this company expects to furnish the highest type of service at this station, which because of its low land line charges on most messages routed to the West will undoubtedly be one of the busiest stations on the Atlantic Coast.

PLANS have been perfected by the Navy Department for the erection of a number of compass radio stations along the Alaskan Coast, and the erection of a radio telegraph station at Cold Bay, according to F. E. Dunklee, radio engineer. Mr. Dunklee is to get certain data for use in connection with the establishment of the proposed stations during his stay here.

GUESTS on Marconi's yacht, cruising in the Mediterranean, danced to the wireless music of an orchestra playing in London.

Well, well, this opens up possibilities, doesn't it?

If you see a man and maid cheek-dancing along Main street in your village, it may be that they have suddenly caught the wireless output of some Broadway cabaret.

If Mrs. Jones of Kennebunkport drops the breakfast dishes and spends the day with Mrs. Brown at the continuous movies, it may be that her husband's dinner is preparing by fireless, conveyed from Mrs. Robinson's cooker at Yuma.

If the Reverend Mr. Psaltry rebukes your absence from the morning services, you can claim that you caught it by choirless.

Maybe blowouts and punctures will all be promptly prepared by tireless, conveyed from Akron.

And maybe, at some time in the future, political campaigns will be conducted by liarless!—L. A. "Record."

A MERICAN ships reaching ports of the United Kingdom after December 1 must be provided with wireless or risk a fine of five pounds. This is the information received by Major J. F. Dillon, radio inspector for the Bureau of Navigation. After next month American vessels in British ports will be subject to the same regulations regarding wireless as ships flying the Union Jack. The order applies to all passenger vessels and to other craft of 1600 tons or over.

EQUIPPED with a wireless telephone as a safety measure in case of emergency, making it the first vessel so equipped, the British bark *Manrewi* will depart from this harbor shortly.

One of the chief reasons for this precaution, it is stated, is because the vessel will carry a full cargo of California gasoline. The cargo is consigned to New Zealand and is being shipped by the Petroleum Products Company of this city.

The apparatus was installed by A. F. Pendleton. It is a complete set, including telegraph instruments, but as the bark will not have an operator in her crew only the wireless phone will be utilized.

Captain R. G. Holmes, master of the craft, looks forward to much enjoyment during the voyage across the Pacific. He declares that he will be able to listen in on all telephonic and other wireless communication between the large ocean liners and in case of emergency will be able to call out over

the Pacific for a radius of 1000 miles by his own voice.

This marks the inauguration of wireless telephones aboard sailing vessels, according to local shipping men. John D. Spreckels recently installed a wireless phone aboard his yacht *Venetia*.—S. F. "Examiner."

TORONTO Ont., October 15.—Preparatory to building a huge wireless station for communication between Canada and England, the Marconi Wireless Company of Canada, has purchased 23 acres of land about nine miles from Toronto. It is understood that this is the first of a chain of wireless stations with which it is expected to dot Canada and encircle the British Empire.

PROBABLY the most unusual "sand-man" program ever given for a group of children anywhere took place at the Children's Hospital, when songs and music came out of the "clear sky" via the wireless telephone.

Directors Roth and Partington of the California Theater planned this treat for the little "shut-ins" through the courtesy of Ellery Stone of the Lee De Forest Radio Company. A special receiving station and Magnavox were installed at the hospital for the event.

SAN FRANCISCO'S first fog since the establishment of the United States naval radio compass bearing stations permitting a vessel to secure her bearing outside the heads, checked the Golden Gate and gave a demonstration of the new wireless signal arrangement.

According to Commander S. D. McCoy, chief of the operators at this port, the service gave very good results and proved its feasibility in assisting ships to navigate safely to anchorage in the harbor.

THE Rev. J. M. Skinner of the Presbyterian Church in Stockton, preached a sermon in a wireless telephone, which was heard at many points within a 100 mile radius of Stockton. His voice was heard at stations in six surrounding counties.

THE mascot of a certain naval radio station was a hungry looking black cat. "—and what do you call him?" asked the newly assigned op. "His ribs are of such prominence that we call him Helix," answered the chief.

VIOLIN IS PLAYED BY WIRELESS WAVE

COPENHAGEN, November 6.—A discovery which is predicted to effect a complete revolution in wireless methods was made public here when a violin was made to play and talk by wireless.

A violin was placed on a wall, while in a room some distance away a melody was played into a sending apparatus. Those present were greatly astonished when the melody automatically repeated itself on the violin. Later the human voice was transmitted, and a sensation was created when the violin repeated quite distinctly the spoken words.

The patent rights of this discovery are held by two young Danish engineers, named Johnsen and Rahbeck, who developed it three years ago. It is based on the previously known fact that certain substances, under electrical treatment, receive similar magnetic qualities.—S. F. "Chronicle."

BIG WIRELESS STATION PLANNED FOR PALO ALTO

Three big wireless stations in California, these, with one at Portland, Ore., to make up its Pacific Coast equipment for long distance transmission business, are planned by the Federal Telegraph Company. The California stations are to be at Palo Alto, Los Angeles and San Diego.

Work here is to be started as soon as permission to raise necessary funds is granted by the Railroad Commission. For this purpose the company asks permission to issue and to sell \$500,000 worth of 8 per cent serial gold notes, payable in annual equal installments of \$100,000 each.

At present the Federal is using the Pacific Telephone and Telegraph telephone lines for transmitting messages received at the South San Francisco wireless station. This contract expires shortly.

The company is handling an average of 50,000 messages a month, an increase of almost two and one-half times the business of 1917.—S. F. "Recorder."

FEDERAL TELEGRAPH COMMENDED

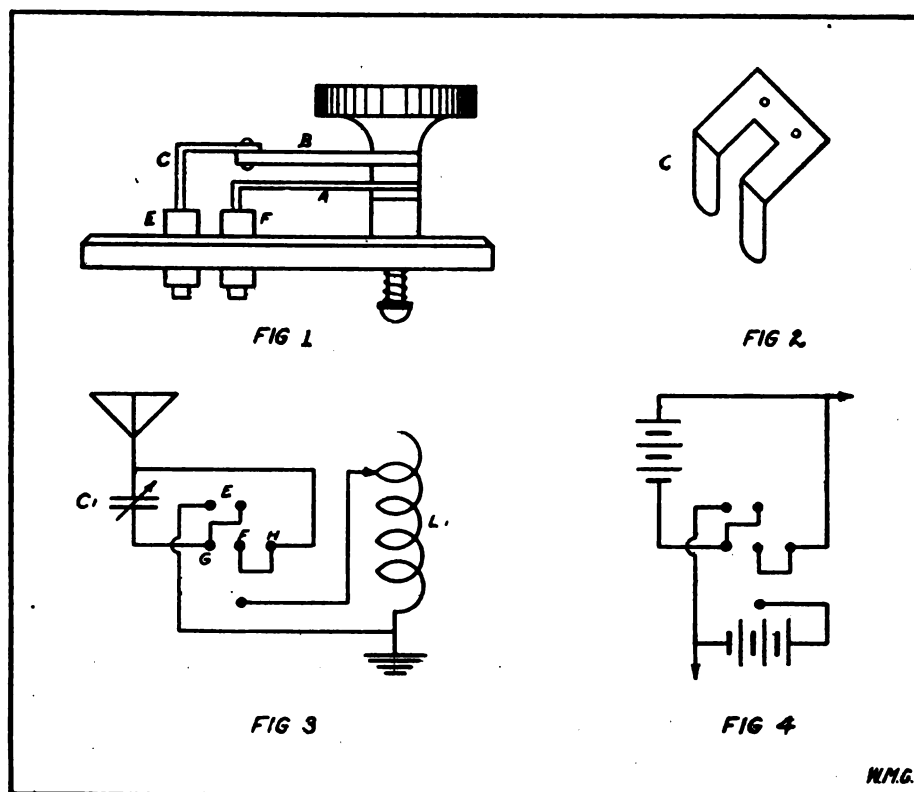
R. S. Griffin, engineer-in-chief of the United States Navy, has written to President R. P. Schwerin of the Federal Telegraph Company, congratulating the company on the excellent results obtained with the duplicate 1,000-kilowatt arc equipment installed in the Lafayette radio station at Croix d'Hins, France. Admiral Griffin says:

"The results of the thirty-day tests of this equipment, recently completed, are very satisfactory to the bureau, the comparative strength of Lafayette's signals as measured at distant stations being from three to five times as great as those received from other European high power stations and solid copy being consistently obtained not less than twenty-two hours out of the twenty-four, regardless of the periods of the day during which fading of signals occurs and notwithstanding the fact that the tests were conducted during the most unfavorable static season.

Griffin also compliments R. R. Beal of the Federal system under whose supervision the construction work was completed.—S. F. "Examiner."

A SERIES PARALLEL SWITCH

By K. Jefferson



NOT being satisfied with results obtained from the construction of series-parallel switches described from time to time, the writer has experimented with and received successful service from the switch hereby described.

By referring to Figure 1 it will be seen that the construction of the switch is quite simple. Figure 2 is a detail of one of the contacts. Figure 3 is a wiring diagram. Figure 4 is a diagram showing another use of the switch as in the case of charging batteries.

In figure 1, A is the contact arm of an ordinary rotary switch. B is a strip of insulating material. A and B must be mounted on the shaft in such

a manner as to rotate together. If the two contact points E are placed 1-8 inch apart and the slot in C is cut to a width of 1-8 inch, very good results will be obtained. The builder can use his own judgment in regard to the other essential dimensions.

Figure 4 shows a method of using the switch to divide a set of batteries while being charged. After charging, the two sets of batteries are again placed into series connection for use. A divided inductance or a pair of inductances can be used in like manner. When connected in series they can be used for increasing wave lengths, and in parallel for reducing resistance.

NEW CALL LIST ISSUED

THE list of AMATEUR RADIO STATIONS OF THE UNITED STATES is now ready for distribution and can be obtained for 15 cents from Superintendent of Documents, Government Printing Office, Washington, D. C. Stamps will not be accepted. The list contains all call letters of amateur stations issued to June 30, 1920. A similar publication, COMMERCIAL AND GOVERNMENT RADIO STATIONS OF THE UNITED STATES, is also ready for distribution and can be obtained from the above address at 15 cents per copy.

Stations copied and worked at 7AD—F. J. Brott, 10 Walk, 1 Madison Park, Seattle, Wash., September 9 to October 26, 1920.

6AAJ, (6AAT), 6AAW, 6ABP, 6ABX, 6ACR, 6AG, 6AJ, (6AK), 6AH, 6AI, 6AE, 6AN, (6BJ), 6BN, 6BQ, 6CC, 6CO, 6CP, (6CV), 6DK, 6DP, (6EJ), 6EP, 6ER, (6EX), 6FE), (6FS), 6FH, 6GO, 6GN, 6II, 6IL, 6JM, 6JN, 6JQ, 6KM, 6MZ, 6NE, 6NO, (6OH), 6QK, 6QM, 6QR, 6RQ, 6SK, 6TC, 6ZK, 6ZE.

7AE, (7AW), (7BG), (7BH), (7CC), (7CE), (7CU), (7CW), (7DA), 7DP, (7ES), 7FH, (7FO), 7FV, (7GQ) (7GY), 7HN, (7IN), 7JP, 7JW, (7YS), 7ZH.

CARDBOARD TUBES

By C. Chandlee Pidgeon

HERE'S a way to knock the "H" out of the H. C. W. (High Cost of Wireless.) Cardboard tubes are used daily in the construction of coils of various descriptions. It was my desire to construct a regenerative receiver and difficulty was encountered in securing the proper size tubes. While glancing around the house I found a small Quaker Oats box, $4\frac{1}{8}$ inches in diameter, a Quaker Corn Meal box, 4 inches in diameter and a Morton's or Diamond Crystal Salt box, $3\frac{1}{2}$ inches in diameter. These tubes are of the ideal size for the regenerative tuners and couplers. A Spotless Cleanser box is three inches in diameter. The only size that I could not find was one with a four-inch diameter. I have made small loose couplers from a section of an oats box and a section of a Shaker Salt box. The tuner works very satisfactorily and I am now incorporating it in a three variometer receiving set. The tubes can be baked in paraffin or some other insulating compound for added efficiency to the finished instrument. Several coatings of insulating varnish will help to stiffen the tubes and prevent warping in damp weather.

BIG STATION TO BE ERECTED IN SUNNYVALE

THE inhabitants of Sunnyvale, California, with the exception of Mr. A. E. Bessey, are rejoicing over the news that the Federal Telegraph Co. is planning on the construction of a high power arc station at Point Sunnyvale. The cost of the plant will aggregate about \$160,000. The foundation will be laid soon as the steel frame-work is already on hand for the superstructure. The towers will be 600 feet high. Mr. Bessey (6BR) will wear the same smile on his countenance that Mr. McGowan (6ZE) wears when the beach station of the U. S. Navy "opens up" with more mush on 200 meters than enough.

NAPA RADIO CLUB HOLDS OPEN HOUSE

THE Napa Amateur Radio Club held its first open house on October 28th. The open house was a "full house" on the occasion and several interesting addresses were made. Mr. Hildebrand of the Willard Storage Battery Company spoke on the benefits of organization and Mr. Clark of the Pacific Gas and Electric Company outlined the future possibilities of electricity. Mr. M. L. Webb was the announcer of the evening and gave a practical demonstration of radio work on the club's transmitting and receiving equipment.

Arc Radio Apparatus

By Jennings B. Dow

Published by Permission of the Secretary of the Navy

PART IV.

FIG 10 shows two types of positive electrode entrances. A shows a circular disc of Bakelite having a hole through its center through which the electrode enters the chamber. To illustrate the application of the rule given above, the minimum dimensions are given. B shows another design in which a thick ebony-asbestos block is used. The use of this construction makes possible a considerable reduction in chamber volume and is a type commonly found in converters designed to use illuminating gas or other gases rich in carbon. By using several blocks, it may be seen that any possible path for leakage may be made very great.

In the design of experimental arcs, it is not recommended that the negative electrode be grounded to the chamber as is commonly the case with commercial arcs. The reason for this is quite obvious. Small arcs, as a rule, are used with coupled oscillating circuits, and the negative side is not ordinarily grounded. Grounding the negative side to the chamber would, therefore, make the chamber a live part insofar as its relation to other parts of the apparatus is concerned.

Magnetic circuit entrances into the chamber should be of approximately the same section as that of the core adjacent to the entrances.

A poppet valve should be provided to relieve the chamber of excessive pressures caused by gas explosions within it. The outlet area will, of course, depend upon the volume of the chamber and for small arcs within the scope of this article, an area of about $1\frac{1}{2}$ square inches will be found sufficient. This valve is usually a spring loaded, conical seated affair, fitted to one side of the chamber. Placing this valve in the bottom of the chamber is to be avoided, if practicable, because particles of carbon falling into it often cause sticking. It will be found convenient in most cases to install the poppet valve in the chamber inspecting manhole cover, thus leaving the bottom of the chamber available for receiving deposits of soot and other refuse which will naturally deposit there and which may be removed through an opening provided for that purpose.

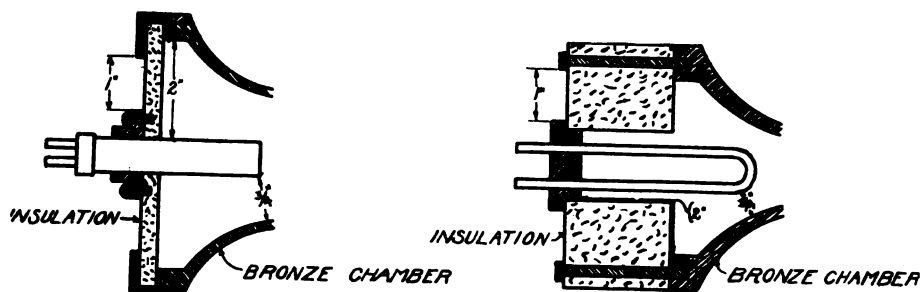


Figure 10

The electrode cooling system should be such that both electrodes benefit by it. An abundance of water should be continuously forced against the copper tip of the positive electrode during the operation of the arc. A water jacket should house the negative electrode holder also. Isolated water circulating systems are recommended for each electrode as considerable inefficiency will result from connecting electrodes electrically with a water conductor which possesses a low high-frequency resistance. In cases of larger arcs, the power consumed by this resistance is such a small fraction of the total output that this precaution need not be taken, but in arcs operating at 500 volts input and having a power output of one kilowatt, a decrease in efficiency of five per cent may result from this source. A convenient arrangement for water circulation is the use of two large bottles fitted up to discharge their contents by gravity through each electrode cooling system.

A magnetic flux density of 4000 to 8000 gauss in the air gap may be used and, in general, the efficiency of the arc will be found to increase up to the point where the 8000 gauss value is reached. If the flux density is greater, difficulty will be experienced in maintaining the arc. At this value of field strength, sudden changes in the input current or a sudden change in the amount of energy taken from the closed oscillating circuit are liable to extinguish the arc permanently and striking will have to be resorted to in order to start it again. Either the closed or open form of magnetic circuit may be used with equal success. The construction of the solenoids should be such that they will not be affected by the heat of the arc chamber or by any potential that the body of the converter is liable to possess due to leak-

age or induction. The use of spools constructed of Bakelite will eliminate the possibility of trouble from either of these sources. One quarter inch Bakelite is recommended for this purpose. If the core is circular in section, a combination of sheet stock and tubing will solve the spool problem very satisfactorily.

After the solenoids are wound, a single layer of bare copper wire or a copper cylinder should be placed over the outside layer of the winding to shield it from the destructive effect of induced currents from high-frequency leads in the vicinity.

The administering of gas into the chamber is an absolute necessity. Alcohol (denatured, wood, or grain) may be used by dropping it into the arc or upon some heating device for volatilizing it within the chamber. For small arcs, the latter method is preferred as it avoids the production of irregularities. Some designers provide a small electric heater inside the chamber upon which the alcohol is made to drop, others provide a small metal or earthenware plate, some distance above the arc and heated by it, upon which the alcohol is dropped. Ordinary coal gas as used for illuminating purposes may be administered into the chamber and used with a high degree of success, and often the arc output may be increased as much as thirty per cent by the use of this substance. When using this substance, however, great difficulty is liable to be encountered in attempting to maintain insulation for any great length of time without cleaning out the chamber. A great amount of soot forms which soon blankets all exposed insulation inside the chamber, render-

(Continued on page 138)

THE AUDION OSCILLATOR*

By R. A. HEISING

(Continued from the November issue)

PART II.

THE operation of the oscillator is thus a cyclic one and is continuous and self sustaining as long as direct current is supplied to the audion to make the plate circuit a two-way conductor for variable currents. The operation of the oscillator may be compared to a steam engine with the grid controlling the flow of electricity as the slide valve controls the flow of steam. The alternating potential on the grid produces an alternating current in the plate circuit just as the slide valve causes steam to move the piston back and forth in the cylinder. The alternating space current produces a large oscillation current in the oscillation circuit as the piston produces a rotary motion of the driving shaft. The oscillation current in producing the original grid alternating potential by passing through L_s , corresponds to the rotating shaft producing the original to and fro slide-valve motion by means of the eccentric. The cyclic action in both is continuous and self-sustaining. The analogy, however, falls down

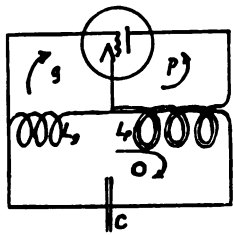


Fig. 3. Hartley Circuit Approximation.

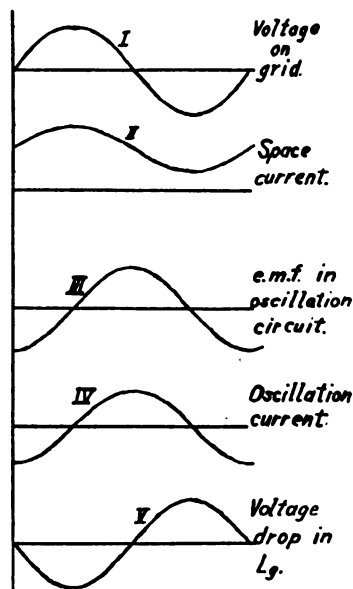


Fig. 4. Phase Relation in Hartley Circuit.

in that the frequency in the audion oscillator is determined by the circuit, while the steam engine it is determined by the

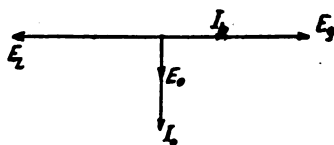


Fig. 5. Hartley Circuit Approximation.

load and steam pressure.

In explaining the phase relations in an oscillator, the resistance will at first be assumed as zero and the circuit as shown in Fig. 3. L_p is shown drawn in two parts to make the paths of the alternating space current and oscillation current separate. This circuit consists of three meshes or complete circuits, grid, plate, and oscillation. They are indicated by the letters g , p , and o . Positive-current directions are assumed in each circuit and are indicated by arrows. The directions in the grid and plate circuits are so chosen that a positive voltage in the grid circuit (which raises the grid potential) causes a positive current to flow in the plate circuit. An increase in the grid potential of an audion causes the space current to increase, and with the direction assumed in the plate circuit as positive, the increase in space current is a positive current. When a positive current flows through inductance L_p it is flowing through an element which is also part of the oscillation circuit and the direction assumed as positive in the oscillation circuit is such that the positive plate current is also a positive current in the oscillation circuit. When a positive oscillation current flows through inductance L_s it flows through an element which also belongs to the grid circuit. A current flowing through L_s in the direction indicated by the oscillation circuit arrow is a positive oscillation current but when referred to the arrow in the grid circuit, it is a *negative* current. The current although flowing in the direction of the arrow in one circuit flows in the opposite direction to the arrow of the other circuit. This must be kept in mind in the following description because it means that a voltage or current in L_s which is positive while considered as in the grid circuit and vice versa. This means that an alternating voltage or current in the oscillation circuit must be given at 180 deg. shift, or reverses, if we wish to talk about it in the grid circuit.

In Fig. 4, Curve I represents the alternating voltage applied between the grid and the filament. This voltage causes the alternating space current, Curve II to flow. In flowing through L_p the alternating space current produces an e. m. f. 90 degrees behind it (shown in Curve III).

This in turn produces an oscillation current (Curve IV) which is in phase with it on account of the frequency being the resonant frequency. The oscillation current in flowing through L_s produces an e. m. f. 90 degrees out of phase (Curve V). This e. m. f. transferred to the grid mesh of which it is a part must be given an opposite sign (for reasons stated before) and it is then observed to be the original voltage applied to grid.

6. Simple Vector Diagram

The phase relations are shown in the Vector form in Fig. 5. The grid voltage is E_s . The alternating space current is I_s . The voltage produced in L_p by I_s is E_o , and this produces the oscillation current I_o . The latter in flowing through inductance L_s produces the voltage drop E_L . This because of oppositely assumed positive directions in meshes g and o must be reversed and is the grid voltage E_s .

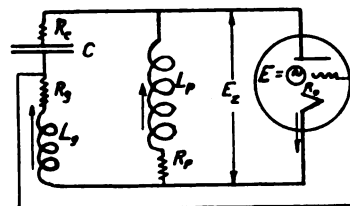


Fig. 6. Rearrangement of Hartley Circuit showing positive directions assumed in various branches.

7. Vector Diagram Including Resistance

In previous explanations the assumptions were made that the oscillation circuit resistance was zero, and that all the plate alternating current passed through the inductance L_p . To show the relations in the actual circuit it is preferable to arrange the circuit as shown in Fig. 6 with the positive directions in the branches (instead of in the circuits) indicated by the arrows. The plate and grid inductances are assumed to have no mutual between them, and each element of the oscillation circuit has its own resistance.

The elements of the oscillation circuit as arranged are called the external circuit to distinguish them from the internal circuit of the audion. Such an arrangement of inductances and capacity has a reactance-frequency curve, as measured between the points connected to the plate and filament, of the form shown in Fig. 7. The resonant frequency for the oscillation circuit as a series circuit occurs at " r " which is at or near the point at which the reactance of the parallel arrangement changes sign. The frequency of oscillation in this type of circuit always occurs just below the resonant frequency on account of the resistance in the circuit elements. This

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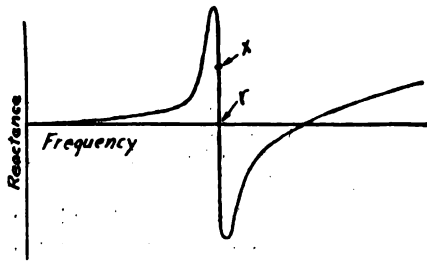


Fig. 7. Reactance of External Circuit of Fig. 6 as a Function of Frequency.

shown analytically, and can be proved by the vector diagrams. The external circuit will therefore have an inductive reactance when attached to the audion as an oscillator. The circuit is looked upon as an external circuit in series with an audion which contains a fictitious generator of voltage E and internal resistance R_0 . The voltage of the fictitious generator is μE_s where E_s is the voltage applied between grid and filament and μ is the amplification constant of the audion.²

In Fig. 8, the voltage applied to the grid is E^0 . The fictitious plate circuit generator is then $E = \mu E_s$ and is in phase. Due to the inductive reactance of the external circuit, the alternating space current I_b lags. The alternating space current in flowing through the external circuit produces a resistance drop $I_b R$, where R is the external resistance, and a reactance drop of $I_b X$, where X is the external reactance. Attention is here called to the fact that voltage drop $I_b R$ is opposite to the direction in which I_b flows, and $I_b X$ is 90 deg. behind I_b . This is not according to a conventional method used by some engineers but it agrees strictly with Faraday's law of the sum of the e. m. f. in a closed circuit being zero. The two counter e. m. fs. produced by I_b add up into the external counter e. m. f., or drop, E_a , an e. m. f. produced entirely by I_b . Equal and opposite to E_a is the e. m. f. E_s which is that part of E which is consumed by E_a . Within the audion I_b produces another resistance drop E_s also opposite in direction to I_b . E_s added to $I_b R$ and $I_b X$ produces a counter e. m. f. equal and opposite to E making the sum of the e. m. fs. in the circuit zero. The voltage applied to, and across the external circuit is then E_s which is equal and opposite to the external drop E_a . It is the driving voltage for the external circuit. The external driving voltage applied across inductance L_p causes a lagging current I_p (Fig. 9) to flow. It is less than 90 deg. behind E_s because of resistance in L_p . E_s also causes a leading current to flow through the other arm $C + L_s$ which is almost 90 deg. ahead (I_s). The sum of the two currents is I_b the alternating space current. I_p is larger than I_s because the operating frequency is below the resonant value and the inductive

reactance of L_p will then be less than the capacitive reactance of $C + L_s$. The current I_s in flowing through the inductance L_s produces a resistance drop A and a

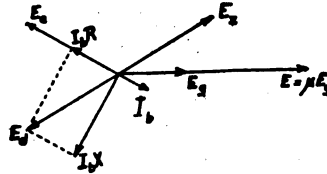


Fig. 8. Vector Relations in the Hartley Circuit.

reactance drop B . The sum of these is E_s the voltage applied to the grid.

The impossibility of this circuit operating above resonance can be shown from Fig. 9. The grid voltage E_s must always be in phase with E as $E = \mu E_s$. E_s is the vector sum of A and B which are voltage drops in L_s . I_s will be just 90 deg. ahead of E_s if the resistance of L_s is zero, but any resistance in L_s produces the drop A and I_s is forced more than 90 deg. ahead of E_s . Then, as I_s is a leading current produced by E_s it can be 90 deg. ahead of E_s if the total resistance in C and L_s is zero, but with resistance the angle is reduced and E_s must be moved closer to it and ahead of E_s . Stated in a few words

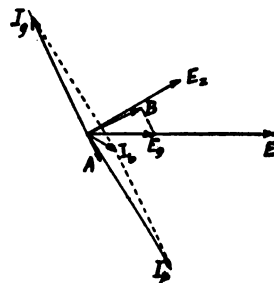


Fig. 9. Vector Relations in the Hartley Circuit.

we can say: (1) the angle between E_s and I_s must always be over 90 deg., (2) the angle between I_s and E_s must always be less than 90 deg., therefore E_s must always be ahead of E_s and E which means an external circuit of inductive reactance and (from Fig. 7) a frequency below resonance.

8. Vector Diagram With Mutual Inductance Between L_p and L_s .

Fig. 10 is a vector diagram like that in Fig. 9 as regards voltages, currents and notation. If there is mutual inductance between L_p and L_s , the current in L_p produces an e. m. f. in L_s which is either e_1 or e_2 depending upon whether the mutual inductance is negative or positive. By a positive inductance is meant a coupling such as to make the total inductance in the oscillation circuit greater—that is $L_0 = L_p + L_s + 2M$. If the mutual is positive I_p

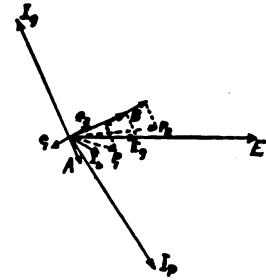


Fig. 10. Influence of Mutual Inductance on Phase Relations.

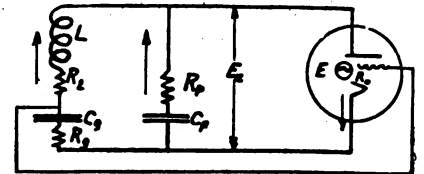


Fig. 11. Rearrangement of Colpitts Circuit showing positive directions assumed in various branches.

produces the e. m. f. e_2 which when added with A to B produces the vector P_2 as the grid voltage. This position cannot obtain as the grid voltage must be in phase with E . To get this, all vectors except E must rotate slightly to the right which means that the external inductive reactance is smaller in proportion to the resistance and that the frequency is nearer the resonant frequency. If the mutual inductance is negative, I_p produces the e. m. f. e_1 in L_s and it with A added to B produces the vector P_1 for the grid voltage. For P_1 to coincide with E , all vectors except E must rotate to the left. A negative mutual in-

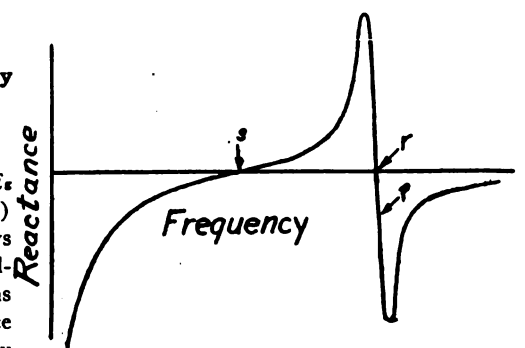


Fig. 12. Reactance-Frequency Curve for External Circuit in Fig. 11.

ductance reduces the voltage applied to the grid, and increases the external reactance, thereby causing the oscillation frequency to drop farther below the resonant frequency. A negative mutual inductance makes the oscillator less likely to oscillate than a positive value.

(To be continued)

²Nichols, *Physical Review*, August, 1917, and June, 1919.

A CHANGE OF HEART

By F. S. JENKINS

THE day before Christmas was raw and blustery with flurries of snow in the air, and the evening was colder yet with great gusts of frigid wind playing hide and seek around New York's gloomy canyon-like streets.

Old Ben Collins was hurrying up Warren Street on his way from work, to home and a hot supper. He was a crusty individual, full of Q. R. N. of the grinder and growler variety. Buttoned tight in his shiny great-coat and with a rusty derby jammed down on his head, it would be hard to imagine him the famous editor that he was.

Glancing in a brightly lighted store window, his eye was attracted by a peculiar array of articles for sale. Near by, stood a young man of jovial countenance, gazing interestedly at the assortment. Under his arms were two large packages.

Halting in his stride and stepping nearer, Ben's sharp eyes roved over the display. Finally, his curiosity getting the better of him, he inquired: "What's all this junk, young man?"

The "young man," turned toward his questioner and with a smile exclaimed: "Junk! That's no junk. Those are instruments for amateur wireless."

"Well that's junk all right," grumbled Collins. "There's one of those young idiots up on my street, with a lot of wires hoisted above his house. Dem fool makes all the lights in my place blink when he monkeys with his crazy contraption. Sits up till all hours annoying the neighbors. Ought to be a law against 'em, I say."

The young man's expression slowly changed from a smile to a frown at this tirade. As the gruff voice finished, he replied: "Say, listen here sir, if you've about ten minutes, I know a little story that I think will change your opinion of these amateurs. Just step in this doorway here, where it's not so cold and windy and I'll spin you the yarn."

Ben's appetite for news got the better of his appetite for food. "I'm from Missouri," he growled.

Lighting a cigarette, the young man began: "'Long about four bells in the third watch, on the evening of December 19th, the freighter 'Pontya' was plowing along through a fifty mile gale off Atlantic City. The wind was off the port quarter and with a heavy deck load and a cranky turbine, she was making heavy weather of it. Finally the plates on number one hold, no longer able to stand the strain, began to start, and large volumes of old Neptune's kingdom poured in. The storm increased in violence and the plates continued to open. The bulkhead began to give and to make matters worse, the turbine on the port screw failed entirely. At last matters got so bad the 'old man' ordered 'Wireless' to send out a call for help.

"Now you probably don't know, sir, but

it's a fact, that in the ether, there are so-called 'dead spots' dreaded by all sea-going radio men. Through these spots radio waves can seldom pass. Signals can sometimes be exchanged with one station, sometimes two, sometimes none at all. This will explain what follows:

"Down on the coast of New Jersey, about a half mile below the Nantoloking Coast Guard Station, lives a little crippled chap named Tom Binny. His father is an old fisherman of little ambition, so consequently the family's circumstances are very meager. Due to the isolation of his home and his useless leg, the poor kid has practically no playmates. He is of a scientific turn of mind and so, due partly to this reason and partly on account of his loneliness, he started to dabble in wireless. The mild interest soon became intense and he spent every cent he could get on parts and instruments. He had little enough to spend, Lord knows, but he finally evolved a receiving set which for looks was nil but for works was good up to eight hundred miles in daylight. He had to content himself without a sending set as no city current was available and storage batteries were too expensive.

"On this same evening of December nineteenth, he had been listening in as usual to the busy ship traffic up and down the coast. His father was over visiting a neighbor and his mother was down at the village buying their frugal supplies, so he had a quiet evening all to himself.

"'Long about five bells he decided to turn in. He laid his phones down and reached for the canvas to cover the beloved set when, clear as a bell from the receivers on the table, came the electrifying call of the spark:

"Sos sos sos de kypz in distress 59 miles east Point Pleasant forward hold flooded turbine disabled need help at once will take to boats in two hours.

"Jamming the phones back on his head, Tom feverishly scribbled down the words as they hurtled through the ether.

"Again and yet again the cry for help rang in his ears, yet the radio traffic of ship and shore station alike continued on, undisturbed.

"What was wrong? Why didn't they answer? These thoughts flashed through his mind as he nervously tuned up to catch a reply.

"All at once the answer dawned on him. The disabled ship was in one of those dead spots he had read so much about and he was evidently the only one who had heard the call.

"There was only one thing to do. He must hobble at top speed to the Coast Guard Station at Nantoloking and give the alarm.

"Catching up his crutch and the scribbled message, he stumbled out the door and up the beach as fast as his one good leg would

take him. Over and over he kept repeating as he fought his way through the icy darkness: 'Oh God, let me be in time! Please let me be in time!'

"What with the shifting sand and the bitter wind, his progress became more and more feeble, until at last, as he reached the station gate he sank down exhausted, unable to go a step further.

"Five minutes later, one of the guards, coming from the boat-house hard by, stumbled over the little huddled body and carried it inside. Tight clasped in his hand was the message.

"For the next fifteen minutes, the wires to New York and Philadelphia were humming with the report of the disaster, and an hour later the 'Pontya's' crew, officers and men, were safe aboard the Revenue Cutter 'Senapa.'

"Eh? Oh Tom's coming around all right. Still in bed from the effects of his trip, but getting better every day."

"Is it a true story! It sure is! I'm the opp. that sent the SOS and this here," indicating the packages under his arms, "is the finest receiving set I could find. The crew of the Pontya bought it and I'm delegated to go down and present it as a Christmas gift. Guess the kid won't be tickled, eh?"

"Huh!" retorted Collins, in a low tone, "Still think it's junk, but," fumbling in his pocket and pressing a fifty dollar note into the operator's hand, "Here, maybe the kid will need a dingus, or something, that you've forgotten."

CRITICISM ON LOWENSTEIN EQUIPMENT IS ASKED

Brooklyn, N. Y.,
Nov. 10, 1920.

Paul R. Fenner, Editor,
Pacific Radio News,
50 Main St.,
San Francisco, Calif.

Dear Sir:

The Lowenstein Radio Company, Inc., 397 Bridge street, Brooklyn, N. Y., have manufactured a number of radio transmitting sets for the U. S. Navy, which have been in service on American ships for some time. Being desirous of hearing from the operators who have used a Lowenstein set, we take this means of communicating with them through your good offices. What we want is honest criticism from the man on the job, so that we may be guided by him in our future work.

We shall be glad to hear from any operator who has used one of our sets.

Very truly yours,
LOWENSTEIN RADIO CO., INC.
G. H. Lewis.

REPELLENT RADIO

By HERBERT WARREN DODGE

OLD FERRIS glanced up at his son Jack, and muttered, "Guess it's all off, boy. They wouldn't even offer to try out the invention." He ceased speaking and bowed his head in his hands.

"That's all right, dad," replied Jack Ferris, "I'll take the apparatus down to Johnson, of the Airway Express Company, tomorrow. I know he will listen to me, as we attended college at Berkeley together. He's a fine fellow," concluded Jack.

"Well, Jack, I hope he appears in favor of the appliance. It certainly would be of extreme advantage to his company if he decided to install it on his airplanes."

The device referred to was a rather compact box, at that moment resting upon the table before Jack. The cabinet contained his father's invention, the "repeller." Delicate instruments controlled by radio were inside the box, representing years of experimenting and testing. Although a patent had been issued, Ferris could interest no radio company in San Francisco with his invention. All were too skeptical to believe that radio could be utilized to actually repel any other object containing an antenna and radio instruments.

However, Tom Ferris was ready to prove all he had said his contrivance would do. But the prominent radio companies could not be bothered by 'cranks,' and deaf ears were turned to him.

"Here it is nearly Christmas," mused Ferris, "and I was hoping—yes, praying, that someone would purchase the 'repeller' so we could buy that little home out in Sunset that Mary was admiring. That would be a nice Christmas present, but I guess there's no use talking about it. Five thousand dollars is a lot of money," he ended with a sigh.

"Yes," said Jack, "mother is in love with that little cottage. Well," he added hopefully, "Johnson may buy the invention."

"I earnestly hope so," responded his father dejectedly.

At nine o'clock the next morning Jack Ferris was in consultation with his college chum, Fred Johnson, manager of the Airway Express Company.

"Jack," said Fred slowly, at the end of a half hour, "your proposition seems O. K. to me, but we'll have to test it out and see if it is as true as you say. Let's go out to Warner Field now; the *Eagle* is in the hangar, and we'll try it out on her." So saying he rose and made his way to the street, Jack following with the precious apparatus

under his arm.

Soon they arrived at the field near the ocean and the *Eagle*, a super-plane, was wheeled out.

A problem confronted them: Upon what would they test out the "repeller"? Certainly another plane could not be used, as there was too great a risk of wrecking it with the powerful action of the "repeller."

Johnson, ever-alert, said: "I've got it! Wait a second," and with that he entered the hangar and in a few minutes drove out an automobile with a fan-shaped antenna erected on top.

"Friend of mine used to be interested in radio-automobiles," he explained, "and he put a set on this one. He's out to sea now, so we can use it," he continued.

The *Eagle* was also fitted with modern radio apparatus and Jack connected up the "repeller" and they left the ground, first having turned on the filament of the audion detector in the automobile and stationing a man to watch it.

"Now!" said Jack when they were at a height of a thousand feet. He pressed the key and a low purring sound seemed to come from the box.

"The work is all over," explained Jack. "Let's land now and see whether the auto moved backward or not."

When the *Eagle* came to a stop the man left in charge of the radio-auto ran up to them and said: "Say, Mr. Johnson, a funny thing just happened while you were up there. The old flivver suddenly began to go backwards and a humming sound seemed to come from those radio instruments. I can't make it out; the engine wasn't even going," he said mystified.

"Yes?" inquired Jack eagerly. "Well, Fred, I guess that convinces you?"

"It does, Jack, and I'll take a week's option on the invention and install it immediately on the *Eagle*. And, by the way, I think I'll require your services as radio operator, too."

II.

STEAMSHIPS are not the only vehicles of locomotion that send their position reports by radio. Seven o'clock that evening Jack Ferris sat in the radio room of the *Eagle* with the receivers on his head listening to the station at San Francisco working a ship in the Pacific.

"*Airplane Eagle, S. F., for Seattle, 50 miles north of Sacramento at 8 p. m.*"

"*Sig. Williams, Pilot.*"

This was the message Jack transmitted to the government station at San Francisco when that operator had con-

cluded with his message to the ship.

The *Eagle* had left that afternoon for Seattle with a special consignment of gold. The Airway Express Company was called upon to deliver the cargo because of the rapid means of transportation. Carrying gold was unusual and the pilot expressed his reluctance to Ferris.

A few miles north of the Capital a heavy wind was encountered which slowed up the *Eagle* considerably and forced her to attain higher altitude.

Jack was still listening at midnight and was surprised to hear abnormally loud signals in his receivers. Furthermore the station was calling the *Eagle* and throwing in the dynamo switch he answered them.

The message he copied was as follows: "*Airplane Eagle. Stop immediately and land or we will open fire on you.*"

That was all! What could it mean? Hastily making his way to the pilot room he showed the message to Williams.

"I knew it!" exclaimed the pilot, "some other machine following us in the air intending to steal the gold shipment. I didn't like to leave San Francisco with such a cargo, but they wanted it in Seattle by tomorrow. We haven't even a rifle!" he said ruefully.

So that was it! Jack, with a pair of night glasses to his eyes, discerned another plane about a half-mile away following them.

Back in the radio room Ferris listened again for the other plane. Only a few amateurs in California could be heard.

The "repeller"! It dawned upon Jack like a flash. He would wait until the hostile craft drew nearer, then he would direct his apparatus upon the plane and press the key—

He could conceive the effect of the powerful instruments. At such a height it would mean sure death to the crew of the bandit airplane unless the pilot could save the machine from falling by manipulating the rudders.

Again the plane was calling the *Eagle*.

"We are only a quarter of a mile from you. Stop and land."

"We are bound for Seattle," flashed Jack, "and intend to get there as soon as possible."

The other plane did not answer by radio, but it did by a shot which snapped a stay-wire. The next bullet pierced the wall of the radio cabin and lodged itself in the wood above Jack's head.

"That was close," muttered Ferris, "they must be very near. Guess it's time for action."

He made an adjustment to the "repeller" and, making sure everything was ready, pressed the key. The purring again sounded and all was still. Back in the pilot room Jack and Williams saw the other craft descending rapidly.

"I wonder what's the matter with him?" asked the pilot. "I thought it was the last of us when he opened fire."

Jack explained the device used to repel the other machine. At his instruments he called the station at Eureka and told the operator to inform the authorities and have the would-be bandits apprehended—they had landed near the border of California and Oregon.

III.

WHEN the *Eagle* arrived at Warner Field after having safely delivered the gold cargo, Jack was met by Fred Johnson, who seized his hand.

"Congratulations, Jack!" he greeted him. "You saved the cargo of the *Eagle* by the use of your invention and caused the other aviators to be arrested. They were a gang of air highwaymen holding up planes and robbing the occupants. That's sure a great invention and I am going to install it on all my planes."

"So they didn't wreck themselves when they fell?" inquired Jack, speaking for the first time.

"No," answered Johnson, "they landed right side up and were held by the police of Concord, Oregon, as suspicious characters. Then when the wireless reports from Eureka were flashed out they were arrested and brought here. They'll get a good long term at Folsom, I'm thinking."

"So you think the invention is worthy?" asked Ferris.

"Yes," affirmed Johnson, "what is your price?"

"Five thousand for the exclusive rights and patent," declared Jack immediately, his mind on a little cottage in Sunset.

"All right," agreed the man of business, "step inside while I make out the check."

* * * *

It was Christmas Eve in a little home in Sunset District. Jack Ferris and his mother and father sat before the open fireplace listening to the pouring rain and howling wind without.

"Satisfied, mother?" asked Jack softly.

"You know I am, dear boy," replied Mrs. Ferris with tears in her eyes.

For a long time they sat quietly. The little clock above the fireplace broke the stillness of the room by announcing the hour—midnight.

When the last stroke ceased Jack went to his mother and with arms around her said, "MERRY CHRISTMAS, mother!"

DO YOU KNOW

THAT in a transmitting tube circuit a grid leak is absolutely essential, and that it must be of the right resistance or the tube will not oscillate properly?

THAT a 220 volt D. C. shunt wound motor, running at twice its normal rated speed, will serve as a source of plate potential for that tube set you are building?

THAT the voltage output of this machine will be about 400 volts?

THAT it is essential that the commutator be kept clean when a motor-generator set is to be used for a tube transmitter if all humming is to be eliminated?

THAT a pure undamped wave for amateur work will carry much better than a spark, but that special means are usually necessary to receive it?

THAT Government equipment designed to receive undamped signals on short waves is provided with a "Rotary Tone Condenser," which is a specially constructed condenser resembling a rotary spark gap in appearance, which is rotated by a small motor. The condenser is connected across the secondary of the receiving tuner, and when rotated at the proper speed increases or decreases the secondary capacity in such a manner that a 500 cycle note is obtained from the received undamped signal?

THAT a number of perfectly good spark sets will be sold for a song because the owners are building tube sets?

THAT this may be years from now—judging from the time that it takes some of the builders to complete the sets?

THAT the filament of a power tube must always be lighted to full brilliancy before the plate current is applied?

THAT neglect of this will often cause the burn-out of all tubes in use?

THAT when using a wavemeter with a hot-wire indicating meter to measure the wave of a tube or other undamped transmitter care must be taken to go up and down the wavemeter scale slowly or the resonance point may be passed over entirely and no readings obtained?

THAT it will be an honor as well as a souvenir to take home a commercial license issued to successful candidates by the Radio Inspector at the Radio Show of the Convention?

Your Classified Advertisement in "Pacific Radio News" will reach the class of amateurs who need apparatus. Don't throw your old apparatus away—there may be a dozen of our readers who are looking for the very instruments that you no longer need.

WHAT OUR READERS WANT TO KNOW

Portland, Oregon,
November 3, 1920.

Editor "Pacific Radio News,"

San Francisco, Cal.

Dear Sir:

In your November issue I notice a letter from amateur 6BJ in regard to the strength of his signals received by many Pacific Coast amateurs. I have heard 6BJ many times and must say that he sure rolls in on a single bulb. But say, Editor, O. M., how much power is this gentleman using? Is that the secret of those "ton 'o brick" signals? Would like to know exactly how much power said station was using prior to September 1st.

Another thing: Why under the sun are all the best part of the "sixers" starting to use these double action keys? Don't we have enough trouble receiving now, with fading signals, QRM, QRN and other things without these "ops." with a double action hacksaw blade slinging a bunch of guff at us in some double-jointed manner? Really, Editor, I would like to hear the opinion of the brotherhood on these keys and their use. Remember—I am speaking of the home-made variety resembling a rebuilt corset steel or hacksaw blade and not the Martin Vibroplex or any other standard speed key. A good Vibroplex or speed key in the hands of a man who knows how to use it is indeed worth while, in fact I believe that the world's record in wire telegraphy was made with one of these keys. This shows their worth, but I'll wager the operator has practiced with it for many moons before he made that record—73.

TEN-NIN-O.

It's not the key that makes the fuss—it's the operator who is using it. 6BJ swears on a stack of Bibles that he has never used over a half k. w.

THE Admiral Line steamer President the first mercantile vessel on the Pacific to be equipped with wireless, will also be the first to have the wireless telephone installed. The Radio Corporation announces that this system will be installed in the near future.

CALLS HEARD BY 6EB

(6AH), 6AJ, 6AM, (6AN), 6BB, (6BN), 6CP, 6CV, 6DP, (6EX), (6FE), 6GO, 6HK, 6HQ, (6JN), 6KL, (6PR), (6QR), 6SK, 6TC, (6ZK), 7GQ and KIX.

UNLISTED SECURITIES

San Francisco, November 10, 1920.

Stocks

	Bid	Ask
Moorhead	12c	.....
National Radio	19c	25c
Poulsen	2¼	.....

SIXTH DISTRICT AMATEUR STATIONS—Continued.

Call	Name	Address
6ADV	R. W. Hickman	440 N. Washington Ave. Whittier, Cal.
6ADW	A. McDonald	1376 Washington St. Los Angeles, Cal.
6ADX	F. G. Beck	417 C Street. Wilmington, Cal.
5ADY	S. Ayres	51 Third Street. San Francisco, Cal.
6ADZ	Electric Lighting Supply Co.	216 W. 3rd St. Los Angeles, Cal.
5AEA	W. P. Bell	1807 Alameda Ave. Alameda, Cal.
5AEB	A. M. Fontaine	4127 Woodruff Ave. Oakland, Cal.
5AEC	O. Bernhard	Boy Scouts' Camp. San Francisco, Cal.
5AED	S. Griffin	1825 Fourth Street. San Diego, Cal.
6AEE	W. W. Grundell	1911 Eddy Street. San Francisco, Cal.
5AEF	P. E. Parker	420 E. Chapman Ave. Fullerton, Cal.
5AEG	N. B. Wells	2827 Union Street San Francisco, Cal.
6AEH	E. L. Albright	2331 University St. San Diego, Cal.
5AEI	H. Blackman	. . . . . Winton, Cal.
5AEJ	H. Lane	53 Cambridge Way Piedmont, Cal.
5AEK	C. Harris	454 17th Ave. San Francisco, Cal.
5AEL	T. A. Cutting	67 First St. Campbell, Cal.
6AEM	P. T. Scott	Rt. 2, Box 177A. Fullerton, Cal.
5AEN	O. C. Frei	. . . . . Tolenas, Cal.
5AEO	F. Lopez	4001 Porter Street. Oakland, Cal.
6AEP	S. Lassen	1472 85th Ave. Oakland, Cal.
6AEQ	Polytechnic High School Science Dept.	. . . . .
		First Ave and Frederick. San Francisco, Cal.
6AER	R. Walker	1712 Russell St. Berkeley, Cal.
6AES	M. L. Hoffman	432 Walsworth Ave. Oakland, Cal.
6AET	C. Schonmaker	199 Douglas St. San Francisco, Cal.
6AEU	Leo J. Meyberg Co.	428 Market St. San Francisco, Cal.
6AEV	R. W. Hart	30 Grand Ave. Oakland, Cal.
6AEW	S. Armfield	. . . . . Woodland, Cal.
6AEX	F. Crowl	1813 Parker St. Berkeley, Cal.
6AEY	F. W. Pratt	550 N. 17th St. San Jose, Cal.
6AEZ	G. J. Quillinan	2246 Lincoln Ave. Ogden, Utah
6AFA	R. Wall	1211 E. 23rd St. Oakland, Cal.
6AFB	R. T. Rafeal	33 Fifth Ave. San Francisco, Cal.
6AFC	A. L. Alderman	1091 Harrison St. Santa Clara, Cal.
6AFD	R. W. Baker	1983 South Ninth East St. Salt Lake City, Utah
6AFE	Boy Scouts' Troop No. 1	. . . . . National City, Cal.
6AFF	Boy Scouts' Troop No. 18	. . . . . San Diego, Cal.
6AFG	Boy Scouts' Signal Headquarters	. . . . . San Diego, Cal.
6AFH	H. M. Ellis	1524 S. California St Stockton, Cal.
6AFI	G. Green	211 Ellen Ridge Ave. Los Gatos, Cal.
5AFJ	H. G. Hopkins	Rt. 2. Yuma, Arizona
5AFK	E. Newton	1161 Benton St. Santa Clara, Cal.
5AFL	O. D. Packard	1428 Olive St. Paso Robles, Cal.
5AFM	University High School Radio Club,	. . . . .
		48th and Webster Sts. Oakland, Cal.
6AFN	W. T. Rathbun	330 Fourth St. Colusa, Cal.
6AFO	B. B. Ellis	343 24th Ave. San Francisco, Cal.
6AFP	G. W. Harriman	2500 Irving Ave. Clifton, Arizona
6AFQ	J. F. Ives	. . . . . Alameda, Cal.

Corrections from previous lists, correct to read as follows:

5HN	P. E. Birlew	2515 Le Conte Ave. Berkeley, Cal.
6IK	F. A. Brandis	1039 Merced Ave. Berkeley, Cal.
5FV	C. A. Peregrine	866 32nd St. Oakland, Cal.
5IY	J. J. Mahler, Jr.	116 Polk St. Napa, Cal.
5QN	K. Barbier	4225 Terrace St. Oakland, Cal.
5PC	L. W. Packard	1121 Bresee Ave. Pasadena, Cal.
6UB	E. A. Portal	. . . . . Los Altos, Cal.
6AAW	A. Woolf	1708 Grove St. Berkeley, Cal.

RADIO CLUB DIRECTORY

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts., San Francisco, Calif. Meetings every Tuesday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

The EDITOR'S MAIL BAG

Our Readers Are Invited to Send Contributions for Publication in this Department.

Pacific Radio News, 50 Main Street, San Francisco, Calif.

Gentlemen:

7YG—Oregon Institute of Technology of Portland Y. M. C. A.—broadcasted election returns for the benefit of amateurs on the night of November 3rd.

The estimate of the 600 stations (licensed and receiving only) of the Seventh Naval District within range is, of course, low because it is known here that many six-stations as far south as Los Angeles heard us, though, of course, our local election returns did not interest them greatly.

7YG used a 2KW, Simpson type, 500-cycle Transmitter of Kilbourne & Clark Co. manufacture, on 330 meters. Power in put used was 1 KW and the radiation was but 10 amperes. The decrement was .055 so that the signals carried well and this decrement permitted local stations to work easily on 200 meters.

A great deal of interest was shown among amateurs in their "hamming" after each report. Several requests for "repeat" came back but this was impossible because of the volume of work to get out.

It was tried as an experiment and the appreciation shown has induced us to lay plans for a 15-minute local press service every night at 9:30 p. m. when news of interest, especially to the Northwest, will be available to amateurs before they could obtain it from the morning papers.

We will advise you when these plans are complete and would appreciate your announcing it in your columns then more definitely. Very truly yours,

A. J. TWOGOOD,

Dean, Engineering Schools.

Oregon Institute of Technology,

Portland Oregon, Nov. 4, 1920.

Vancouver, Washington,

September 30, 1920.

Editor, "Pacific Radio News":

Just to let you know that your magazine is very much appreciated in this locality. In particular I would like to compete in the contest for transmission to Honolulu. My opinion is that whether or not the test will prove satisfactory will depend largely on weather conditions.

It seems that whenever a test is mapped out for a definite date, especially a long distance test, the weather conditions always fail to co-operate. However, I am willing to try my luck at it. Please tell Mr. Mulrony to listen for 7CU on 230 meters at any convenient time and I will take particular care to have my station in tip-top shape.

Truly yours,

Mumford Bros. Radio 7CU.
(Continued on page 147)

2QR IS HEARD IN SCOTLAND

THE following communications have recently been received by 2QR and the accompanying photograph shows the radio telephone equipment that carried the human voice to Scotland.

October 30th, 1920.

Editor, Pacific Radio News,
San Francisco, Calif.

Dear Sir:

Herewith a new photograph of Station 2QR, owned by myself and my son Harold. Quite a lot of new equipment has been added since the last photograph was taken.

We have made several distance records on radio phone transmission, copies of the different letters received relative thereto being enclosed herewith.

The letter from Scotland is self-explanatory, and while we are loathe to believe that it is possible, or that it can be true, yet Mr. Benzie states the facts exactly as they were, which makes the thing more puzzling, and in view of the enormous importances of his letter, we have written him for further and more substantial details of this record, and will advise you more fully later.

Please note that to date we have been reported as being received very QSA on our radio phone at Bristol, Conn., Ashland, Ohio, Canton, Ill., and Napanee, Ont.

Hoping that you may find the photograph and our description of interest, we are,

Yours respectfully,

HUGH ROBINSON,
HAROLD ROBINSON.

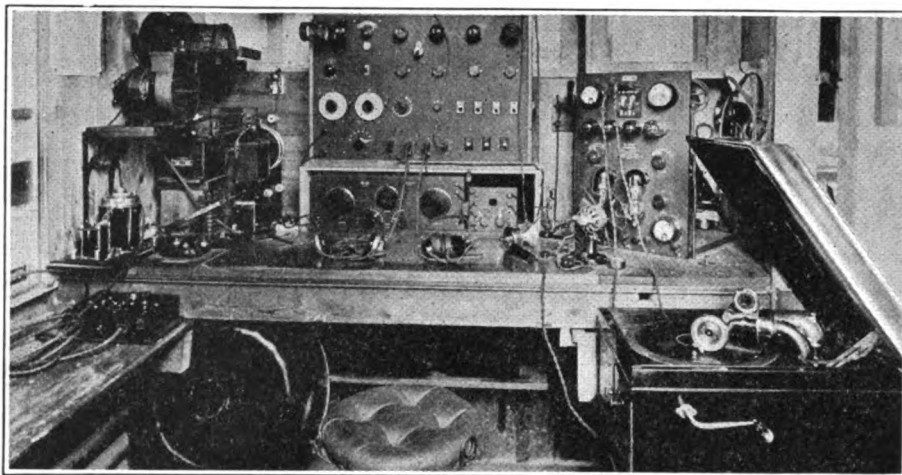
Station 2QR,
13 Walnut Street, Keyport, N. J.

Copy of a letter received from Scotland by 2 QR.

Denmlll Cottage
Peterculter,
Aberdeenshire, Scotland.
12th, Oct. 20

Dear Mr. Robinson:

I write to say that my friend and I received your transmission on Oct. 6th to your friend, I could not be sure of this gentleman's name, but we heard the rec-



ord "Roamin' in the Gloamin'" by Harry Lauder and the other tune very clearly; also that your power at the time was 100 watts. I write you this as no doubt you will be interested to learn that you can be heard over here with so small a power. I was using 3 valves. I would be greatly obliged if you could transmit again (radio phone) say three weeks after you mail your letter to me as the letters take some time to reach here. As regards time two hours after the transmission referred to above would suit, hoping you will manage to co-operate in our tests.

Your transmission was received here at about 6 p. m. G. M. T., so if you could transmit two hours later than the time you transmitted on October 6th it would suit me nicely as this would be about 8 p. m. G. M. T. As I do not know how long your time is after ours, this is the only way we could arrange anything definite.

Yours faithfully,

(Signed) GEO. W. G. BENZIE.

P. S. The above letter received by Station 2QR, Mr. H. H. Robinson, No. 13 Walnut Street, Keyport, New Jersey.

Copy of letter received by Station 2QR Mr. H. H. Robinson, No. 13 Walnut Street, Keyport, N. J.

Napanee, Ont.

Oct. 25th, 1920.

Radio Station 2QR
13 Walnut Street,
Keyport, N. J.

Dear Sir:

I am in receipt of your letter of the 20th inst. requesting me to let you know if it was your radiophone or spark set I heard. It was the phone set.

You came in QSA, but the voice was indistinct. I am using one British V-24 triode valve and tickler circuit with De Forest coils.

Hoping that this information is satisfactory, I remain, with 73's,

Yours sincerely,

(Signed) W. A. EATON.

186 Exeter Terrace,
Buffalo, N. Y., Oct. 26th, 1920.

RADIO 3FE.

Napanee, Ont.

Dear Friend 2QR:

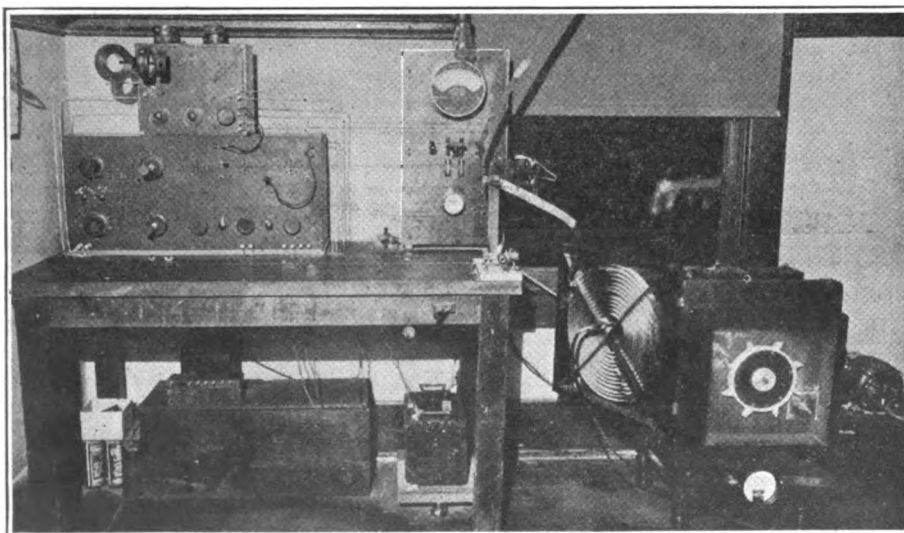
I heard your radio phone Sunday night and am anxious to know what you were using. I have a short wave regenerative set and three step amplifier, but was just using the regenerative alone when I heard you. Static is bad here, so can't use the amplifier much. I heard that you were using a De Forest phone set, but your voice was very clear and distinct, and I missed the usual hum that the local ones give.

Would appreciate a description of your set.

Well cul.om. "73's."

(Signed) GEORGE B. SEARS (8LB).

THE station shown in the accompanying half-tone is that of Mr. Louis Falconi of Roswell, New Mexico. Many of our Pacific Coast amateurs will be interested in the equipment on account of the reliability of communication that it has established. 5ZA has combined efficiency with SYSTEM in the installation of his apparatus. His instrument table is devoid of any unnecessary equipment. Signals from this station have been reported heard at Fort Pierce,



Florida; Princeton College, N. J.; Pittsburgh, Pennsylvania; Valley City, North Dakota; Portland, Oregon; Los Angeles, California, and many other distant points. Satisfactory communication has been established with amateur stations at a distance of more than 1000 miles.

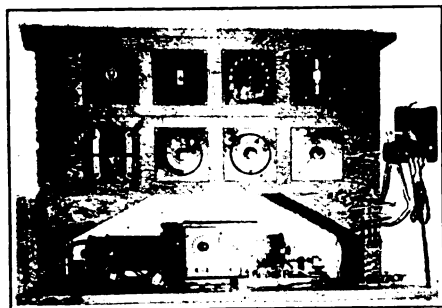
The transmitter consists of both rotary and quenched gaps, Thordarson 1 K. W. transformer, pancake oscillation transformer, oil immersed condenser constructed of copper sheets and glass plates, and a radiation meter. The transmitter is mounted on an angle-iron frame and assembled into one complete unit, thereby avoiding the use of unnecessary leads in the oscillating circuit. The rotary gap is of the belt-driven type with the motor mounted on back of the panel.

The switchboard on the table controls the power circuit. A large ammeter indicates the power input. Under the table may be seen the "A" and "B" batteries as well as a vibrating rectifier for charging the filament battery.

The receiving equipment consists of a long wave receiver using honeycomb coils. A short wave receiver is also used for amateur work and is of the variometer regenerative type. The upper small cabinet houses the long wave units, while the lower cabinet houses the short wave apparatus and a two-stage amplifier. The amplifier is connected in such a manner that it may be used with either receiver. Plugs and jacks are used for varying the amplification steps and for the telephone connections.

The aerial is constructed of four wires, eighty feet in length and of an average height of sixty feet.

NEATNESS and efficiency prevails at 6WM, a photograph of whose station we show herewith. The transmit-



ting equipment, not shown in the photo, consists of a $\frac{1}{2}$ K. W. Thordarson transformer, 12 tooth rotary gap, 3 sections of Murdock condenser units, pancake type oscillation transformer and 5 K. W. transmitting key. The aerial is of the four wire type, 100 feet in length. Stranded tinned copper wire is used and a cable of 19 strands of No. 8 solid copper is used for a ground lead. The receiving set shows up clearly

in the photo. A two step amplifier and several variometers have been added to the receiving equipment since the photo was taken.

Statement of Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912

Of Pacific Radio News, published monthly at San Francisco, California, for October 1, 1920.

State of California, County of San Francisco—ss.

Before me, a notary public, in and for the state and county aforesaid, personally appeared H. W. Dickow, who, having been duly sworn according to law, deposes and says that he is the owner of the "Pacific Radio News," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Pacific Radio Publishing Company, 50 Main street, San Francisco.

Editor, Paul R. Fenner, 50 Main street, San Francisco.

Managing editor, none.

Business manager, H. W. Dickow, 50 Main street, San Francisco.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) H. W. Dickow, 50 Main street, San Francisco.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state) Paul R. Fenner.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the

company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above, is—. (This information is required from daily publications only.)

H. W. DICKOW,
Owner.

Sworn to and subscribed before me this 23rd day of September, 1920.

(Seal) MARGUERITE S. BRUNER,
Notary Public in and for the City and County of San Francisco, State of California.

My commission expires January 8th, 1922.

STATIONS WORKED BY 6OC

6FS, 6AK, 6EJ, 7CU, 7BP, 7DA, 7IN, 6FE, and 6OH.

The following stations report hearing 6OC with good audibility: 6SK, 6JD, 6EA, 6AJ, 6DP. A home-made $\frac{1}{2}$ KW transformer, Benwood gap and oil condenser are the essential parts of the transmitter used by 6OC. With this equipment he succeeds in getting four amperes into the air.

CALLS HEARD BY 6JD

Heard: 5ZA, 9LR, 6AH, 6AS, 6CV. Worked: 7CU, 7ZI, 7DA, 6OH, 6DP, 6AV, 6OR, 6BQ, 6GE, 6PJ, 6II, 6BN, 6JN, 6EX, 6AN, 6ZE, 6JR, 6BJ, 6CO, 6AT, 6QM, 6UM, 6EJ, 6AK, 6EP, 6JI, 6ZB, 6MZ, 6AE, and 6AM. Stations 6JI, 6ZM and 6MZ can be worked any time, day or night.

CALLS HEARD BY 6EA (Additional)

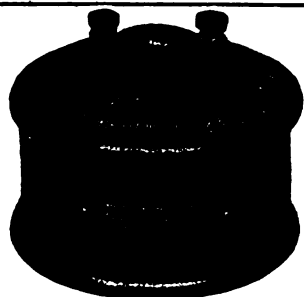
Stations heard are: 5ZA, 6ABX, 6AH, 6AM, 6NE, 6PJ, "RI", "SF", (QRA?) Stations worked are: 6AE, 6AK, 6DP, 6EJ, 6FE, 6JF, 6JN, 6JR, 6OH, 6QM, 6QR, 7ZI. Anyone hearing 6EA please write. All letters answered.

6BB, the 500 cycle spark station at the University of California Radio Club, is penetrating the ether as far north as Vancouver and as far south as Los Angeles. The power input is $\frac{1}{2}$ K. W. and stations in Reno, Nevada, have been worked of late. Propaganda relating to the 12th amendment on the California ballot has been broadcasted every Tuesday evening.

ERRATA

Through a mistake in re-copying the original wiring diagram of the article entitled "A Short Wave Regenerative Receiver of High Efficiency and Unique

Control" in our November number, the connection between the grid condenser and grid proper was omitted. Unless this circuit is completed the receiver will not function properly.



**CHELSEA
VARIABLE CONDENSERS**
(Die Cast Type)

No. 1.—.0011 m.f. mounted	\$5.00
No. 2.—.0006 m.f. mounted	4.50
No. 3.—.0011 m.f. unmounted	4.50
No. 4.—.0006 m.f. unmounted	4.00

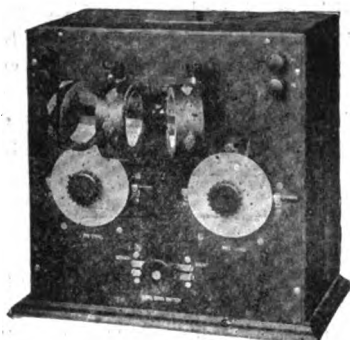
Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large scale reading to hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counter-weight.

Purchase from your dealer; if he does not carry it, send to us. Bulletin sent upon request.

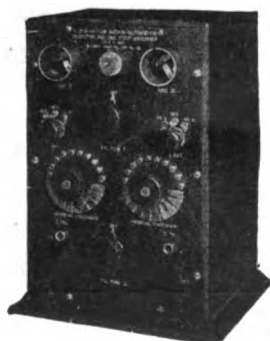
CHELSEA RADIO CO. 13 Fifth St., Chelsea Mass.
Manufacturers of Radio Apparatus and Moulders of Bakelite



Christmas Suggestions for the Radio Amateur



Type T-200
Multi-Wave Tuner
Wave Length, 150; 25,000 Meters



Type P-300
Combination Audion-Ultra
Audion and One-
step Amplifier

PUT De Forest Radio Apparatus on your Christmas list. Here are two instruments that will greatly increase the efficiency of your set.

**Type T-200
Multi-Wave Tuner**

Responds to any wave length, 150 to 25,000 meters. Contains triple adjustable coil mountings; Vernier primary and secondary tuning condensers; primary condenser switch; all mounted on engraved Bakelite panel and in handsome cabinet; size, 13x18x12 3/4. Price (without coils).....\$85.00

**Type P-300 Combination
Audion-UltraAudion and
One-Step Amplifier**

Specially designed to fill a real need for an instrument of this kind in the average amateur station. When used in connection with the T-200 Tuner shown above, it completes a receiver of unequalled efficiency. Cabinet size, 12 1/2 x 8 3/4 x 7 3/4. Price (without tubes).....\$75.00

Send 10 cents in stamps and get the De Forest Catalogue "D" giving complete descriptions of these cabinets, as well as many other quality instruments.

**DeForest Radio
Tel. & Tel. Co.**

Inventors and Manufacturers of High
Grade Radio Apparatus

1415 Sedgwick Ave., N. Y. City

LEE DE FOREST, INC.

Western Distributors

451 Third St.

San Francisco



AERIAL MAIL SERVICE IS IN- AUGURATED TOO EARLY; RADIO SYSTEM UN- COMPLETED.

THAT the aerial mail service from San Francisco to New York was established by order of Second Assistant Postmaster-General Prager at least two weeks too soon became obvious recently when it was learned that a mail plane had dropped from sight and was supposed to be lost somewhere in the Nevada desert.

The radio system by which the San Francisco field will be able to keep in communication with the planes and the landing fields clear across the continent has yet to be completed. Nor have the ships now carrying mail "over the hump" and across the plains been equipped with wireless. As a result a pilot leaving here is out of communication with the flying field and is liable to lose his bearings.

Had Montgomery Field been fully equipped and ready for the task imposed upon it by the Second Assistant Postmaster-General, Pilot John L. Eaton would not have been lost in the Nevada desert, the critics of the air mail service point out. The radio at that field would have picked up trace of him almost at once, it is declared.

Had the plane been fully equipped with wireless telegraph and direction finder, to be installed on all airplanes, that will notify the pilot the instant he swerves from his course, Pilot Eaton would not have been the object of a state-wide search.—S. F. "Bulletin."

The five bulb radio telephone set of the Radio Telephone shop that was heard in Vancouver, Washington, will be on exhibition at the Radio Show of the Pacific Coast Convention. Mr. A. F. Pendleton, manager of the Radio Telephone shop, will give daily demonstrations of the equipment.

6 BN'S SPARK SET FOR SALE

1 Rotary control rheostat .. \$	2.00
1 Primary input regulator ..	2.50
1 8-pt. 3450 RPM rotary.....	25.00
1 Motor with 6-pt. disc 4000 RPM	12.50
1 Thordarson Oil Plate Con- denser	25.00
1 Murdock Oscillation Trans- former	4.00
1 0-5 Hot Wire Ammeter....	3.00
1 3-4 K.W. Thordarson (new type)	35.00
1 C.W. 500-v. Transformer..	5.00
Numerous Binding Posts, Contacts and Knobs	

Holliway & Shaw-6BN

1175 Washington St., S. F., Cal.

Trans-Pacific Radio Operators Log

By W. Breniman
and G. E. Knudsen

A 32-Page Pamphlet containing reliable data on Pacific Coast Radio stations, call letters, weather reports, time signals, wave length data, press schedules, etc.

EVERY COMMERCIAL OPERATOR SHOULD HAVE A COPY

Ready For Distribution on

November First

Price 50 cents

W. BRENIMAN

Room 420 24 California St.
San Francisco, Calif.

LEARN WIRELESS At Home By Mail



Big Concerns In Need of Operators

Calls Coming In Steadily For National Radio Institute Graduates

Many attractive positions are now open in Commercial Land Radio Service, Merchant Marine, Radio Supply Factories, Lake and Ocean Steamship Lines, Telegraph Companies and U. S. Shipping Board.

Salaries up to \$3500 a Year

Exceptional opportunity for ambitious men for promotion to the higher branches of Radio. You can learn Wireless the National Radio Institute way, quickly and easily by mail, right in your own home in your spare time. No previous experience or training necessary. With our help you can quickly qualify for a First Grade Government License, and a good position.

Our graduates qualify as Senior Operators and start with a salary of \$125 a month besides Room and Board, which means more than \$200 a month. One of our recent graduates is getting \$6000 a year.

U. S. Department of Commerce recognizes N. R. I. graduates and allows them a credit of 5 points when taking examinations.

Travel Without Expense

If you are eager to travel—eager to visit foreign countries—Wireless offers you the chance of a lifetime. On shipboard you are rated as an officer, living and eating with the officers. However you are not obliged to travel if you secure a position at one of the land radio offices which are steadily increasing in number.

Instruments Furnished Free

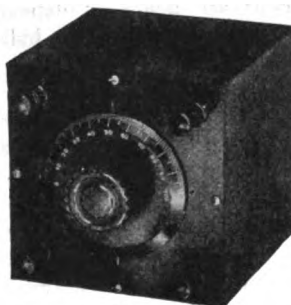
In addition to all books and equipment with which we supply you, we furnish FREE to every student, a Natrometer, which consists of an automatic transmitter and receiver. You receive the instrument after your enrollment; it becomes your personal property upon completion of our course.

The Natrometer automatically sends you messages in International Code, just as though they were coming to you from a station a thousand miles away! The instrument is operated entirely without the use of aerials.

Send for Free Book

Write today for FREE catalogue of interesting and valuable information.

National Radio Institute
Dept. P N Washington, D. C.



Type 12

HERE IT IS

Lattice Wound Variometers Especially Designed



Type 7

TO IMPROVE THE SHORT WAVE REGENERATIVE CIRCUIT

Realizing the need of a neat, compact and highly efficient variometer for the modern receiving set, we have produced one which we feel will meet the requirements.

Type 7 is assembled ready for panel mounting and can be easily mounted by simply drilling a 1/4-inch hole in the panel.

Type 12 is a complete unit and consists of Type 7 mounted on a 4 1/2 x 4 1/2 bakelite panel incased in a mahogany finished cabinet. Four binding posts are provided so that leads can be connected to any side.

Both types are furnished with a standard 3-inch dial and knob and make a very attractive instrument.

PRICES (Charges Prepaid)

Type 7G (for grid circuits)	\$ 7.50
Type 7P (for plate circuits)	7.50
Type 12G (for grid circuits)	12.50
Type 12P (for plate circuits)	12.50

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CONDENSERS

Connecticut, Table Mounting, Maximum Capacity .0013.....	\$5.00
Chelsea No. 1, Table Mounting, Maximum Capacity .0012.....	5.25
Chelsea No. 2, Table Mounting, Maximum Capacity .00068....	4.75
Chelsea No. 3, Panel Mounting, Counter Balanced, Cap. .001..	5.00
Chelsea No. 4, Panel Mounting, Counter Balanced, Cap. .0006	4.25
Amco Fixed Telephone Con- denser .....	.75
Grebe Grid Condenser and leak	1.20
Chelsea Variable Grid Con- denser	3.00

SOCKETS

Remler, Back or Table Mount- ing	\$1.50
Ace, with grid leak.....	1.50
Ace, Casting only.....	.55
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General Radio	1.75
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Remler Junior, Back Mount- ing	\$1.00
Remler No. 81.....	1.75
Paragon	1.75
Parkin, Front Mounting.....	1.00

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Acme, Fully Mounted.....	7.00
Federal, Unmounted	6.00
Federal, Mounted	7.50
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Murdock, 2000	\$4.75
Murdock, 3000	5.75
Connecticut, 2000, Navy Stand- ard Headband	5.75
Connecticut, 3000	6.50
Brandes, Superior	7.25
Baldwin, Type D	17.00
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Murdock, No. 324.....	\$.75
Adams Morgan	1.75
Jove	2.00
Grebe, dust proof.....	2.80
De Forest	3.00

GREBE

Vacuum Tube Unit.....	\$17.00
Single Stage Amplifier.....	25.00
Two Stage Amplifier.....	50.00
Detector and Two Stage Amplifier	75.00
Variable Inductance	16.50
Variable Coupler	16.50
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No. 18, Single Cotton, lb.....	\$1.20
No. 20, Single Cotton, lb.....	1.45
No. 23, Single Cotton, lb.....	1.90
No. 26, Single Cotton, lb.....	1.90
Enamel	2.80
No. 28, Single Cotton, lb.....	3.00
No. 31, Single Cotton, lb.....	4.70
No. 34, Single Cotton, lb.....	4.80

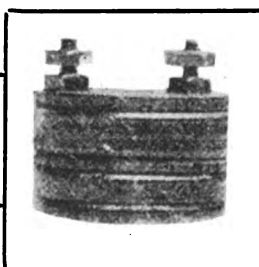
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Western Radio Electric Company

550 SOUTH FLOWER ST.

LOS ANGELES, CALIF.

*Grid
Condensers*



*Prepaid
50 cents each*

Hermetically sealed. 100 per cent efficient. Not subject to changes of atmosphere. Efficient performance guaranteed. A recent patent permits the construction of very small capacitances in very small compartments.

Crescent City Radio Company

Dept F.

P. O. Box 1104.

NEW ORLEANS, LA.

When writing to Advertisers please mention this Magazine

ARC RADIO APPARATUS

(Continued from page 127)

ing the arc temporarily useless. It is recommended, in cases where the converter is designed to use coal gas, kerosene, gasoline, acetylene or other gas having a heavy solid product of combustion, that the arc be so designed as to provide additional insulation within the chamber.

The choke coils, of which there should be one in each leg of the supply circuit, are for the purpose of smoothing out ripples in the input current and for the purpose of preventing high-frequency surges from entering the supply circuit where they might cause damage to windings such as are found in meters and other light electrical machinery. These inductances should have a value of at least one henry, which, unless a great amount of wire is used, will require the use of an iron core. A quality too often overlooked in the design of choke coils for high-frequency circuits, is the minimizing of winding capacity. This is very essential, for, in order to prevent high-frequency surges from entering the supply circuit, the distributed winding capacity must be negligible. Their inductance need only be a fraction of that which is required in the supply circuit for stabilizing the supply current and for producing a high potential when the arc is extinguished during each cycle. The field coils are generally depended upon to furnish this additional inductance.

The frequency of oscillation of an oscillating circuit containing an arc is not, strictly speaking, a function of the capacity and inductance in that circuit. For example, the fundamental equation,

$$f = \frac{1}{2\pi \sqrt{LC}},$$

does not necessarily hold and as a matter of fact, can seldom be used with accuracy. This results from the fact that the arc resistance is continually changing with the wandering of the arc around the electrodes, and because the oscillations directly produced by small arcs are generally non-sinusoidal. Invariably, oscillograms show this to be the case with small arcs. If beat reception is used, this fact will evidence itself by the continual changing in the frequency of the audible signal.

Insofar as the design of oscillating circuits for use with arcs is concerned, this deviation presents no especially difficult problems, as the variations are not so great that small adjustments of inductance or capacity will not compensate for them.

Mica condensers are recommended for the closed circuit if one is used, but these should be specially designed to withstand the high potentials frequently found. Certain Navy Standard jars are very good, also. These have a capacity

of 0.002 microfarad each and a bank of four jars (series-parallel arrangement) having a total capacity of 0.002 microfarad will be found admirably well adapted for use with arcs up to 5 K. W. capacity.

For the smaller arcs, one jar, filled with oil to prevent sparking, and for cooling purposes, will suffice.

Inductances should be wound with stranded wire to minimize high-frequency resistance. The best installations use a special "Litz" composed of hundreds of strands of enameled copper wire braided over with one covering. For small experimental installations, the commercial stranded lamp cord (one conductor) may be used, and this may be wound upon any non-metallic form. No separation between turns other than that provided by the insulation will be necessary. For arcs larger than the 2 K. W. size, larger conductor and additional separation between turns will be necessary.

A very satisfactory inductance unit may be constructed by making a spool of two large phonograph records and a small circular disc of wood at the center. The wood disc should have a thickness equal to the diameter of the wire over the insulation, and this will make possible the winding of a spiral inductance with any flexible wire. Several of these units may be mounted upon a horizontal rod for convenience in adjusting the value of mutual or self inductance. Formulae and data for the design of inductances and capacities may be found in many publications already on the market, hence their appearance here would be highly superfluous. Bulletin No. 74 of the Bureau of Standards is recommended for any information in this direction that may be necessary.

(To be Continued)

A NEW antenna has been erected on the roof of the Humboldt Bank Building, San Francisco, for the radio-phone station in the California Theater of Lee De Forest, Inc. This change, together with several other improvements made by the company's engineers, has already resulted in increased strength of telephonic and telegraphic signals. According to present plans this station will furnish the music for the radio ball to be held at the Radio Convention.


It may be of interest to our readers to know that on Sunday, September 12, from 11:23 a. m. up to when the NPG arc sent the noon time signals, POZ was heard by 6EA. His audibility was readable on a single Audiotron, using the ultra-audion hook-up with a home-made "Eaton" oscillator connected on a 200 meter transmitting antenna (45 feet long).

New Catalog
of
**Radio
Apparatus**

RADIO APPARATUS
Our apparatus
must please you—
all your money
returned if it
does not.

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**QUALITY
APPARATUS
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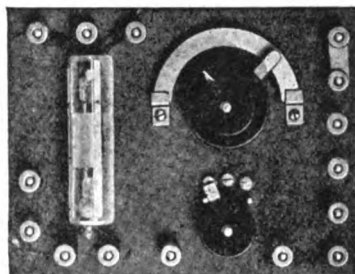


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Marble Base
Silver Contacts**
Ask for Catalog No. 94P98.

\$5.85

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"Signal" Radio Apparatus



"Signal" Vacuum Tube Control Panel

No. R38.....\$12.50

Our Vacuum Tube Control Panel is without doubt the most adaptable, compact and efficient instrument of its type on the market. Unlike most panels, the circuits are not fixed. Instead, the terminals are so brought out that the experimenter can use any vacuum valve circuit without needless crossing of wire or doubling connections to any binding posts. Controlling the current values of the vacuum valve is remarkably easy, due to our combination switch, only one hand being necessary to operate both potentiometer and filament rheostat. Another fine feature is the small switch for cutting in either filament or cutting out both, which lessens the danger of breaking the filament leads and makes either filament accessible. Price does not include tube.

"Signal" Panel Mounting Variable Condensers

No. R76-43 Plate .0008 M.F. \$5.10
No. R77-21 Plate .0004 M.F. 4.50
No. R78-11 Plate .0002 M.F. 3.90

The constant demand for a condenser for panel mounting has caused us to manufacture these three models. We have so constructed them as to permit mounting on any panel from $\frac{1}{8}$ to $\frac{3}{8}$ inch in thickness. Each instrument is furnished with a metal scale calibrated to 180 degrees. The knob and pointer are removable by means of a single flat head machine screw. The plates in our condensers instead of being the usual .015 in thickness, are die stamped from hand rolled aluminum sheet .026 thick. The bearing plates are 3/16 inch black formica. Two connection strips are furnished. We also manufacture the 43 and 21 plate for individual use, with glass case, at a slight increase in price.

We manufacture a complete line of amateur wireless instruments and if your dealer cannot supply you write our nearest distributor for our complete catalogue, mentioning your dealer's name.

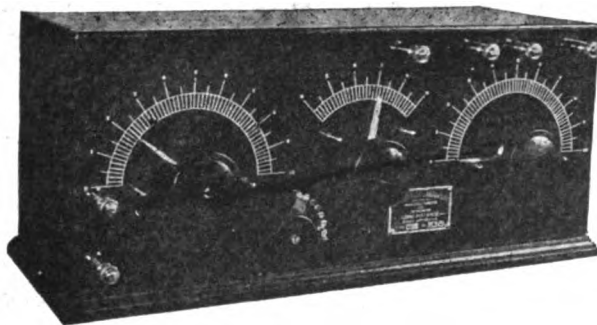
SIGNAL ELECTRIC MFG. CO.

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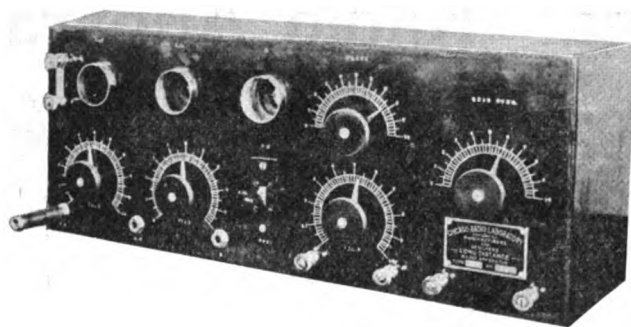
Globe Commercial Co., 618 Mission St., San Francisco, Cal.	R. E. T. Pringle Co., 95 King St., East, Toronto, Ont.
G. C. Kowfeldt & Co., 2541 Chicago Ave., Minneapolis, Minn.	C. H. Wallis & Co., Syndicate Trust Bldg., St. Louis, Mo.
Signal Electric Mfg. Co., 33 S. Clinton St., Chicago, Ill.	Newman Stern Co., 1874 6th St., Cleveland, Ohio.
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It won't perch on the tree, but--- IT MAKES A "BIRD" OF AN XMAS GIFT



C. R. L. Paragon Reg. Receiver

The C. R. L. Paragon, with its tremendous amplification factor and extreme electrical efficiency combined with mechanical perfection and convenience, makes the ideal Christmas present—and you can be sure that it will be appreciated—**BUT** be sure that you get the genuine C. R. L. product. Look for our name on the instrument. The genuine C. R. L. Paragon is used in almost all long distance stations throughout the country. Price, F. O. B. Chicago, \$65.00.



C. R. L. Amplifigon, Type AGN-2

IF A "BIRD" OF A GIFT ISN'T ENOUGH FOR HIM, ADD AN AMPLIFIGON AND MAKE IT A "WHALE"!

The C. R. L. Amplifigon detector and two step amplifier is now equipped with phone plug and jacks for detector and each step, our special 3-way battery switch with transmitting position, extra phone posts, NON-SQUEALING transformers and many other special features. Combined with the C. R. L. Paragon, it makes up the BEST complete short wave receiver on the market today, bar NONE. Price, F. O. B. Chicago, \$105.00.

Both sets fully guaranteed for TWO YEARS.

Licensed under Armstrong and De Forest patents.

Special preparations made for Xmas deliveries. Write for our descriptive bulletin.

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Let us show you how our standard products can be made to solve your insulation problems.

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Cor. King and Yonge Sts., Toronto, Ontario, Canada

THE STANDARDIZATION OF APPARATUS DESIGN

(Continued from page 123)

agree on details, but if the fundamentals of the experimenters' wants are boiled down, certain conclusions can be drawn.

The first fact precipitated is that nine hundred and fifty of every thousand are not highly technical radio men. That is, they can't give an intelligent explanation of the amplification factor of a tube, or the measurement of decrement. If someone talks of matching tube impedances, they are speechless. In fact, not more than fifty out of a thousand can work out the inductances and capacities for a receiver to operate over a given range of wave lengths.

Experimenters do not spend a great deal of money. For every station worth a thousand dollars there are five hundred which represent no more than fifty dollars in cash expended.

But here is the paradox. Every one of them wants his apparatus to look like real, commercial stuff. It must have the atmosphere of scientific instruments. Here is the manufacturer's problem—to produce this effect of refined, yet sturdy design, and to do it at a low price. And it is no small problem.

One of the first and most important steps toward this achievement is to so design or complete sets as to produce an effect of symmetry. As the old houses with their knick-knack furnishings have passed out, so the conglomerate, helter-skelter radio station, has seen its last days. Even the casual visitor, on whom the experimenter secretly enjoys making an impression, is not convinced if the apparatus looks like a collection of assorted instruments.

Moreover, the experimenter finds himself handicapped if the equipment and its arrangement is not sufficiently versatile to permit the trying of new circuits, the introduction or substitution of different instruments, or the temporary removal of one part of a set-up.

Therefore, the optimum system of designing complete sets and supplementary or individual instruments must give, separately and collectively, that desired appearance; it must be adaptable to experimental work or permanent installations, and must meet the final, and largely controlling factor of low price.

The G. A. Standardized Construction

Mr. Sleeper's answer to these conflicting requirements was the "five by five" system. That is, all the panels in the examples of design which he submitted were of dimensions in multiples of five. The smallest panel, only used in special cases, was 2.5 by five inches. The majority of the separate instruments were carried on 5x5-inch panels, while others had panels 5x10 inches, 10x10 inches, and 10x15 inches.

But it was not enough to decide on the panel sizes. Individual instruments must not only function with others of various makes,

(Continued on page 144)

Rotary Gap

WITH 110 VOLT A. C. OR
D. C. MOTOR

\$12.00

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Portland Radio Exchange

RADIO APPARATUS BUILT
TO YOUR SPECIFICATIONS

We also have a stock of reliable
Radio equipment on hand including
the apparatus manufactured by the
Radio Development Co., and Pacific
Radio Exchange.

LET US KNOW YOUR WANTS

422 Board of Trade Bldg.
PORTLAND, ORE.

Get that Boy a Wireless Set for Christmas

Nothing could be more interesting or instructive. It trains the mind and furnishes scientific, never-failing amusement to young and old. If you do not know just what kind of a set to buy, send an "S O S" (call for help) to

Our Radio Dept.

We not only carry a full stock of Wireless supplies and sets, but we also are prepared to give valuable advice and counsel as to the best set to buy.

Complete set that will re-
ceive 200-mile messages
for as low as

\$16.00

De Forest Honeycomb Coils, General
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Ear Phones, Plain Copper and Silk
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JUST OFF THE PRESS SOMETHING NEW

Simple description of the Radio Telephone with complete circuits of a Trans-
mitter, Receiver and Amplifier. With this data any one can construct a Radio
Telephone capable of talking fifty miles. The Amplifier used with a loud speaker
intensifies the voice very clearly. 50 cents postpaid.

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RADIO TELEPHONE

Buy Your Radio Apparatus on the Pacific Coast

De Forest, Amrad, Radisco, Bunnell, Mur-
dock, Moorhead and other apparatus carried
in stock at list prices F.O.B. Seattle.

MAGNAVOX AGENCY

Arco Amplifying Transformers.....	\$5.00
Federal Transformers	7.50
Mica Grid Condensers.....	.50
Genuine Navy Rheostats.....	2.75
45-volt "B" Batteries.....	5.00
Audion Panels	11.00
Audion Panels (professional).....	15.00
1-stage Amplifier	22.50
2-stage Amplifier.....	40.00

We reached Portland (150 miles) with our
type "O" Radiophone using AC. Why not
install one?

Northwest Radio Service Co.

609 Fourth Avenue

Seattle, Wash.

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SHEETS - TUBES - RODS

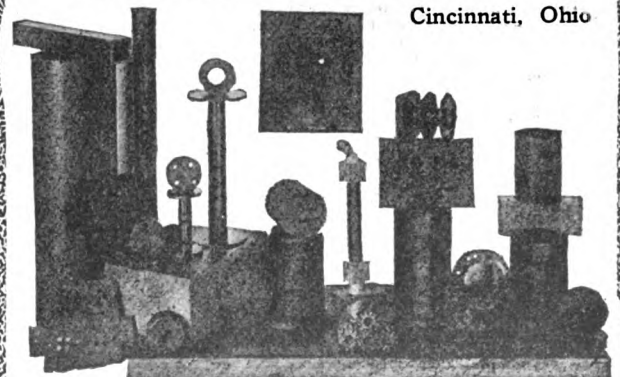
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof ins-
ulation with exceptionally high dielectric prop-
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warp or shrink.

Formica is the ideal material for panels and
other insulation parts of Radio Apparatus, on
account of its superior electrical and mechanical
properties, as well as its splendid appearance.

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put new life in
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HI-GRADE WIRELESS INSTR. CO. ASHEVILLE, N. C.

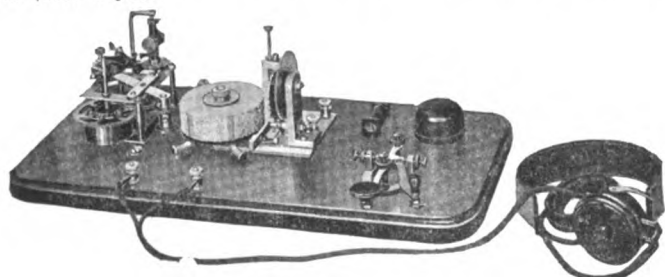
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The Demand for Good Wireless Operators Far Exceeds the Supply

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The transmitter shown is the celebrated Omnigraph used by several Departments of the U. S. Government and by the leading Universities, Colleges, Technical and Telegraph Schools throughout the U. S. and Canada. Start the Omnigraph, place the phone to your ear and this remarkable invention will send you Wireless Messages, the same as though you were receiving them, through

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CONVENTION BRIEFS

A PPLICATIONS for seat reservations at the Convention have been received from points as far distant as North Dakota, Reno, Nev., Los Angeles, Calif., Chicago, Ills., Santa Barbara, Calif., and from other remote cities.

MAYOR ROLPH of San Francisco will open the Pacific Coast Radio Convention with an address over the telephone from his residence, from where it will be carried to the California Theatre and sent "into the air" by the De Forest Radiophone. By means of an amplifier and Magnavox, the address will finally reach the Convention Hall.

THE Hotel Whitcomb has been selected as the official hotel headquarters for the visiting delegates and others who contemplate attending the Radio Convention. Busses will meet all incoming trains and steamers. The special rate quoted for visitors is \$2.50 per day for a single room without bath and \$3.00 per day and up for a single room with bath. Visitors may, of course, select any hotel but it is the desire of the Committee on Arrangements to house the entire delegation in the same hotel in order to further the acquaintances of all concerned.

OUT-OF-TOWN radio men who desire to attend the radio banquet and radio ball are kindly requested to make their reservations at an early date. The radio banquet will be a novel affair. The price has been set at \$1.75 per plate.

THE arrangement committee has undertaken the task of giving the "long distance delegates" a royal time on Thanksgiving Day. A number of members of the San Francisco Radio Club have agreed to invite the visiting delegates to their homes for dinner when the main convention is brought to a close. There will be no convention activities on the night of November 26th.

Radio Apparatus of Quality

Antenna Wire	
No. 14 85 ft. per lb., hard drawn copper.....	80c lb.
No. 12 50 ft. per lb., hard drawn copper.....	80c lb.
No. 14 85 ft. per lb., soft copper.....	80c lb.
Storage Batteries	
Everready Storage for Audion Filament—6v.—40 amp. hr.....	\$19.50
Everready Storage for Audion Filament—6v.—60 amp. hr.....	\$21.00
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"B" Battery—Standard Variable Voltage—Navy Type.....	\$3.00
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Brandes Superior Receiver	\$8.00
Brandes Trans-Atlantic	15.00
Brandes Navy Type	17.00
Murdock No. 55 Receiver, 2,000 Ohms	5.25
Murdock No. 55 Receiver, 3,000 Ohms	6.55
Vacuum Tubes	
Moorhead Electron Relay.....	\$6.00
Moorhead Amplifier	7.00
Vacuum Tube Sockets	
Murdock	\$1.00
Mica Grid Condensers	
Signal Electric .....	.75c
Variable Condensers	
Parkin .001 mf. unit alone, may be mounted on any shaft.....	\$1.50
Parkin .001 mf. unit with knob, shaft and pointer.....	2.00
Parkin .001 mf. unit—complete with 3 in. black dial.....	2.50
Perfection knocked down—21 plate.....	2.25

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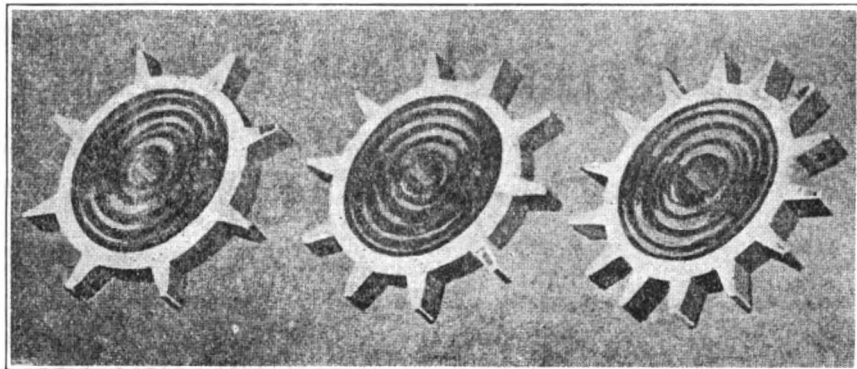
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Made with 4, 8, 10 and 14 points. Drilled for any size motor shaft. Has WIDE sparking points that are tapered, thus giving the quick break that is so much desired by those who know.

THE PRICE OF THIS DISC IS \$8.00

Designed for 1 K. W. installations

Order from your dealer. He has them in stock. If not we can ship direct and make IMMEDIATE shipment.

Specify size of motor shaft when ordering.

9LC THE BENWOOD CO., Inc. 9KU
Cor. 13th and Olive Sts., ST. LOUIS, MO.

Materials and Parts

FOR THAT NEW SET YOU ARE BUILDING, WE HAVE IT

Brass sheet, round and square rods, sheet aluminum, fibre, bakelite and hard rubber cut to size, machine and wood screws, binding posts, switch points, knobs, insulators, switches of all types, variable and fixed condensers, and cardboard tubing.

Murdock, Acme, Tresco, Bunnell, Moorhead, Parkin and Burgess products in stock and we can give you the service you want. Our new catalogue sent for 5 cents, which will be refunded on first order for one dollar or over. Try us on your next order.

KEYSTONE RADIO CO.

DRAWER 307

GREENVILLE, PA.

(Continued from page 140)

but the line of any one company must be so planned that the separate parts can be combined into complete circuits. Also, this subdivision cannot be carried out too far. Complete tube units were developed ranging from a single audion detector to a detector and two-stage amplifier. Many radio men maintained that a detector and two-stage amplifier, with three jacks, could not be put on a 5x5-inch panel, but it was done beautifully and easily. Separate condensers and inductances were worked out covering all the various requirements of tube and crystal circuits.

These instruments can be put together to form any known circuit, yet the panels, when grouped always give the finished appearance of a single panel without its disadvantages. A complete set can be added without making it unsightly.

However, this was not the whole story. With the instruments designed for standardized panels, some method of mounting them was needed. Again, Mr. Sleeper was called on, and with the writer, worked out the G. A. instrument case, now being made the subject of a design patent. It was found that, with all binding posts on the front, the advantage of the system was destroyed by the net work of wires draped over the panels.

Accordingly, a small connection panel was mounted, by square brass rods, to the rear of the main panel. Then, at the back of the box, an opening was made so that when the main panel was put on the front of the box the connection panel fitted into the opening at the rear. The top of the box was hinged to permit inspection or the changing of tubes. By doing this, all the advantages of panel mounting were retained, and the binding posts relegated to the rear where the wires could run around as much as they chose without spoiling the front.

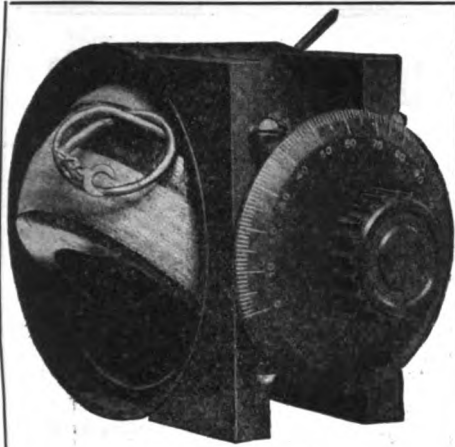
If the panels are not fitted in boxes they can be held together by brass strips, a very satisfactory and convenient arrangement. Boxes can be purchased later if desired.

The General Use of "Five by Five" Construction

It would not be right to take up so much of the valuable space in "Pacific Radio News" to do nothing more than tell why and how the G. A. Company adopted the "five by five" system of apparatus design. The object of this article is to show other manufacturers the advantage of the method. We all know that the average experimental station is made up of instruments from a number of companies. It is certainly desirable to have the different instruments from one company supplement each other mechanically as well as electrically. And how much it will help the experimenter to raise his own standards if he can fit together in a complete set the apparatus of different companies.

The writer believes that the Western manufacturers will not fail to see the advantages of the "five by five" system as such Eastern companies as Amrad and others have seen.

When writing to Advertisers please mention this Magazine

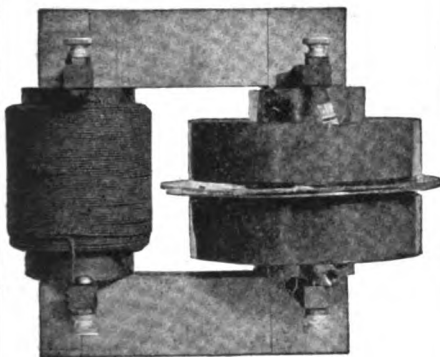


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry maxim to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

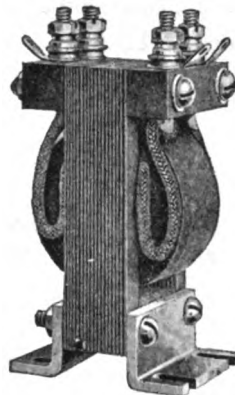
Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps.

To obtain the very best results use Federal Standard Accessories



No. 226-W—Type A
Audio Frequency
Transformer

THEY ARE USED by the leading Experimenters, Manufacturers and by the Government.

The standard 226-W Audio Frequency TRANSFORMER is more popular and efficient than any other because it GIVES RESULTS. YOU SHOULD USE IT.

Our new Bulletin 102 W-B is now ready for mailing. Send 4c in stamps.

CONTAINS NEW INFORMATION

Our line of Jacks and Federal Duo-Lateral Inductances just out.

If your dealer does not have them, write the

Federal Telephone and Telegraph Company

1766 Elmwood Ave., Buffalo, N. Y.

PACIFIC RADIOSCHOOL ARC AND SPARK SYSTEMS

THE MOST UP-TO-DATE AND EXCLUSIVE RADIO SCHOOL IN THE WEST. LATEST TYPE POULSEN 2 KW ARC TRANSMITTER AND INDEPENDENT TYPE ONE KW 500 CYCLE SPARK SET. EQUIPMENT IN ACTUAL OPERATION.

NAVY STANDARD RECEIVING SET WITH AUDION AMPLIFIER. UNDER THE PERSONAL SUPERVISION OF ADDISON S. MCKENZIE, CHIEF ELECTRICIAN, U. S. N. R. F., FORMERLY INSTRUCTOR AT MARE ISLAND NAVY YARD AND W. A. VETTER, FORMERLY CONSTRUCTION FOREMAN FOR THE MARCONI WIRELESS TEL. CO. INSPECTION INVITED. SEND FOR DESCRIPTIVE CIRCULAR.

433 NEW CALL BUILDING

SAN FRANCISCO

FOR PERFECT SIGNALS AND SOLID COMFORT, WEAR Brandes Matched Tone Receivers



"Superior" 2,000 ohms weight 14 oz., complete with head band and polarity indicating cord. Price \$8.00.

Send 5c for catalogue "C"

We were not satisfied when we accomplished mechanical perfection of our receivers to such a high degree. Lightness and comfort are almost as necessary as the perfectly matched tone for which Brandes Receivers are famous.

We, therefore, equipped our receivers with an improved head band instantly adjustable to any size head. Check nuts hold the adjustment. Made of Galvanized Piano Wire, covered with strongly woven Khaki. NO metal parts come in contact with the wearer's head, and the head band cannot catch the hair even when adjustments are made on the head. Other metal parts are nickel plated brass, making the head band absolutely rust proof. Our new head band is the strongest, most durable, and lightest of its kind on the market.

Our receivers are now equipped with polarity indicating cords. This eliminates any danger of demagnetizing the receivers when Vacuum Valve Detectors are used.

Give yourself a Christmas present. Order any pair of our receivers, try them for 10 days in comparison with the phones you have now. If they aren't better receivers for clearness, sensitiveness, distance and comfort than what you are using, return them to us, and back comes your money immediately and without question.

C. BRANDES, Inc. Wireless Receiver Specialists
Room 819, 32 Union Square, New York City

N O S T A T

"Conqueror of Static"

Cutting The Cost of Radio

NOSTAT ACOUSTIC TUNING CHAMBERS
IDENTICAL IN MATERIAL, WORKMANSHIP AND DESIGN
TO OUR FAMOUS MODEL 4, BUT WITHOUT TELE-
PHONE, BINAURALS OR BASE.

Ready for use with your own receivers, and the price—lower than
that for which you could make them—**\$10.95**



For working through
(QRN) or (QRM)

The one piece of Radio
equipment you can not
afford to be without

For Sale by
NOSTAT COMPANY 118 St. James Pl., Brooklyn, N. Y.

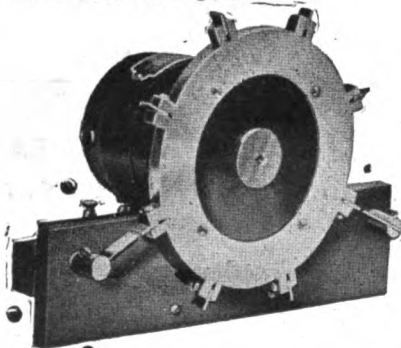
A CHRISTMAS COMBINATION

Pacific Radio News and Q. S. T. for one year, \$3.25. Regular Price, \$4.00. An appropriate
gift for your radio friends.
PACIFIC RADIO NEWS, 50 MAIN ST., SAN FRANCISCO



DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are
privileged to deduct on your first order of \$1.00. Catalog posi-
tively not sent otherwise. This edition of our wireless catalog
is the most complete and elaborate we have ever put out. It em-
braces everything in wireless worth while. As an encyclopedia of
information it is invaluable. It is printed on excellent paper with
a beautiful cover. Your amateur friend will tell you that there never has been any
wireless catalog to take the place of Duck's, and above all, that you can absolutely
rely on the quality of every instrument listed in this catalog. In a word it is all
worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in
Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we
believe, far in advance of any rotary gap on
the market within a range even of twice
the price. It is the final development of many
different types made in our experimental
Radio laboratory. It fulfills every require-
ment of the ideal rotary gap. It is neat and
attractive in appearance; simple and durable
in construction; possesses a wonderful mo-
tor; has a cast aluminum rotary wheel,
beautifully polished; every part is in perfect
alignment; there is no wobbling of the
motor; produces and maintains a clear and
pure 500-cycle note; is instantaneous in ac-
tion; permits of no dragging of the spark;
has contacts of tempered flat copper of proper length and width, easily and quickly
any length.

The picture above really does not do it justice. There is no rotary gap we have
ever sold that we consider in the same class with this gap, and we have therefore,
discontinued the sale of all other types listed in our catalog.

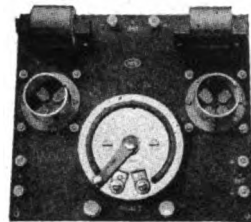
Any purchaser is privileged to return it within three days if it does not come
up to all the high claims we make for it. A first-class Rotary Gap is the very
heart of an efficient transmitting set, and we cannot too strongly emphasize care
in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

When writing to Advertisers please mention this Magazine

Do You Know



that the ACE Type B 2-step Am-
plifier will give you 450 times am-
plification of signal? Price \$20.00,
ready to wire. Diagram furnished.

We manufacture and handle com-
plete lines of Radio instruments
and accessories.

Write for catalog.

"You may pay more—but you can't
buy better."

THE PRECISION EQUIPMENT CO.

2437 GILBERT AVE., Dept. F
CINCINNATI, OHIO



Our Paragon Rheostat

has become the
standard filament res-
istance. For back
of panel or table
mounting. 2 1/4-in diam-
eter. 6 ohms.
1 1/2 amps.

\$1.75 Postpaid
Immediate shipment.
Standard VT Socket \$1.00. Why pay More?
4 Volt Variable "B" Battery, \$3.60
Include Postage on 4 Lbs.
Complete in handy wooden case and ad-
justable phosphor-bronze "Jiffy" con-
nectors. Better than block batteries! If
one 4.4 V. unit weakens prematurely, it
can be removed and replaced, thereby
not impairing the total voltage—making
this the best battery value on the market.

Audiotron Adaptor

Consists of standard 4-prong
base with brass supporting
connectors. Permits mount-
ing tube in vertical position,
so filament will not sag and
touch grid.

\$1.75 Postpaid

Aerial Wire 1c Per Foot
7 strands No. 22 solid cop-
per—tin plated to prevent
oxidation. Include postage on
15 lbs. per 100 feet.

Ground Wire 8c Per Foot
\$7.00 Per 100 Feet

No. 4 solid copper—triple
braid—rubber covered. In-
clude postage on 20 lbs. per
100 feet.

Lightning Switch \$4.00
600 volts, 100 amps., S.F.D.T.

Radio Equipment Co.

630 Washington St.
Boston-11, Mass.

METEOR ELECTRIC CO.

309 So. Flower St.,
Los Angeles, Calif.

MANUFACTURERS AND
RETAILERS OF

RADIO APPARATUS

Also Parts and Supplies

We Have An Exchange Dept.

Used Apparatus Bought, Sold and
Exchanged

CONDENSER OIL

THE EDITOR'S MAIL BAG

(Continued from page 133)

Oakland, Calif.,

October 13, 1920.

"Pacific Radio News",
San Francisco, Calif.

Dear Editor:

I, as most other amateurs, are behind you in your crusade to stop the unnecessary QRM that many amateur stations are causing in the immediate vicinity of the Bay Districts.

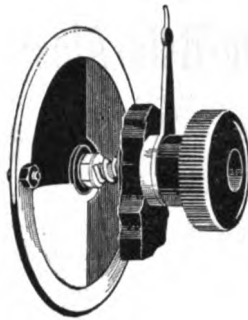
When I read of the several letters written by "Kicker" and Mr. Newall in your last issue, it makes me think that the air hogs should "get next to themselves" and stop this QRM and QSA business. Things are no better than before—in fact, they are getting worse. The fellow making the most noise is not the one who is doing the long distance work. I have taken the stand that I will not answer the question QSA and QSK, unless I know that the fellow has just tuned his set or something of the sort. I am asking every reader of "PNR" to take the same stand and if you see fit to publish this letter in your columns I feel that it will help the campaign. I ask all radio men to join me in this absolutely necessary stand against selfish children. An Old Timer.

THE TELEPHONE BUG

Good Lord—where are all those radio telephones coming from? Every night I hear another one busting in on us. We fellows with spark coils and transformers had better start a league to eradicate those music-sending animals. DeForest is making the California Theatre work overtime for his phone set. Poor old DeSousa is hitting the ball via 6BN. Art Hickman's records are being worn flat by 6UV and several fellows in Oakland are stepping lively between the phonograph store and their radio station with reinforcements in the line of needles and phonograph springs. The "dearie" stuff is still hopping over the Catalina circuit and Mr. Petersen is giving his one-lunger the "high" out on Grove street. Aeroplanes with phones are flying over our heads; underground phone systems are springing up and a city phone is on my desk. Well, I'm drunk with the fever. Does anybody around here want to buy a perfectly good ½ K. W. transformer with accessories?

You can buy that new apparatus with the commission money that you realize on subscriptions secured for "Pacific Radio News." We have a good proposition for you. Write for full details.

Turn your spare time into dollars by securing subscriptions to "Pacific Radio News." Any ambitious amateur can handle our new proposition. It will interest you. Write for details.



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16

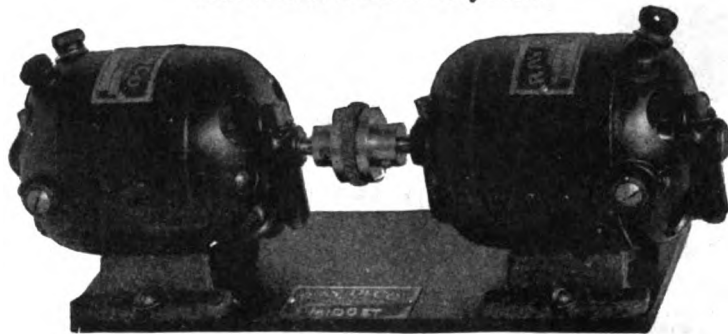
Dealers: Write for discounts

PARKIN MFG. CO.,

San Rafael, Calif.

WHY THE Q. R. M.?

Use **UNDAMPED WAVE** transmission. Now made possible by the "MIDGET" Motor Generator Unit, designed for that **VACUUM TUBE** of yours.



A "MIDGET" Motor Generator unit

installed on your radiophone **ELIMINATES** cumbersome transformers and rectifiers. No induction hum. **CONSTANT VOLTAGE**. Efficient operation. Self regulating. No starting device or field rheostat necessary. **MOUNTED ANY PLACE**, back of panel, in cabinet, under table. **AMPLIFY SUPPLIES THREE VACUUM TUBES**.

MOTOR—Universal wound. Operates satisfactorily on A. C. or D. C. 110 or 220 volts.

GENERATOR—Shunt wound. 15 watts capacity at 275 volts D. C. **DIMENSIONS**—5½ in. x 4 in. x 11½ in. Net weight 9½ lbs.

Both machines mounted on common cast iron base, coupled together by means of flexible insulating coupling, allowing quiet operation and perfect alignment.

F. O. B. Chicago, Ill., \$42.35

Can be shipped via Parcel Post

Our "HYLO" motor generator unit, supplying both **FILAMENT CURRENT** and **PLATE CURRENT**, thus eliminating the possibility of **DEAD STORAGE BATTERY** at a critical moment. Made in capacities up to 100 watts, at 500 volts.

The "STANDARD" Motor Generator unit made in capacities of 50, 100 and 175 watts, at 500 volts.

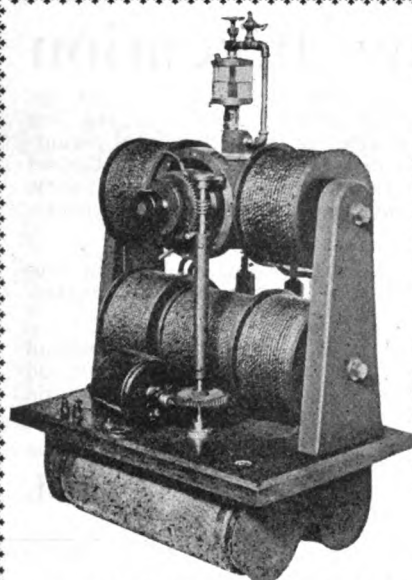
RAY-DI-CO.

(Not Inc.)

2653C N. Clark St.

Chicago, Ill.

When writing to Advertisers please mention this Magazine



Hello Honolulu-Hello Alaska

Everybody will hear you if you open up with twelve amperes in your antenna on 4000 meters using continuous waves from this 5 K.W. Arc Converter. Designed and constructed by the author of "The Design and Construction of a One Kilowatt Arc Converter," "Arc Radio Apparatus," etc. Signals from this converter have been reported loud at 1500 miles during daylight. Operated by 500 volts D.C. (street railway voltage). Chamber and electrodes water cooled—just connect to fresh water service. All castings are made of bronze and carefully machined. Solenoids alone contain over one hundred pounds of copper wire. Operates best on wave lengths in excess of 3000 meters, although with a chopper much lower wave lengths may be used. This piece of apparatus is mechanically and electrically perfect. Its service has been confined almost to research work by experienced and careful operators. Cost \$400.00 to build. Weight 300 pounds. Complete with carbon rotating motor and choke coils under base.

Price \$200.00, F. O. B. San Francisco

Jennings B. Dow

U. S. S. TEXAS, SAN FRANCISCO, CAL.



HOOK 'ER TO YER BULB

The Most Wonderful Tuner in the World for \$10.00

Add Parcel Post—Coils only - - - - - 6.00

About four months ago I purchased one of your mysterious 20,000 meter tuners. And today am copying POZ—YN—NPM—MUU—LCM—IDO—OUI. Haven't had much time to sit in but the best part to tell you about this black box is that all this foreign stuff comes in on a 35 foot aerial 35 feet high on one end and 20 feet on the other end. I'm always ready to recommend the black box instead of any other inductance made.

(Signed) ERNEST F. SCHWACH,
1637 Parkside Ave., Chicago, Ill

KNOCKED DOWN AND ASSEMBLED CONDENSERS

Which kind do you want? Made for panel mounting and are complete with scale pointer and knob. Used all over the world now and still going strong. No C.O.D. orders. Add parcel post. Buy from your dealer and send us his name if he cannot supply you. Canadian amateurs buy from local dealers or write us for nearest dealer. Formica tops and bases. Movable plates are screwed on and not clamped.

11 Plate K.D.	\$1.80
21 Plate K.D.	2.25
41 Plate K.D.	3.20
11 Plate assembled	2.75
21 Plate assembled	3.25
41 Plate assembled	4.25



SOLD BY YOUR DEALER OR

TRESCO, Davenport, Ia.

Be a sport and send 5c for our Catalog. Foreign orders solicited. Canadian Amateurs buy from Canadian dealers. All products licensed under Marconi and Armstrong Patents.

EXPERIMENTERS

who send orders to the G. A. never experience endless delays and needless letter writing.

Grid
Condenser ...35c
Phone
Condenser ...35c
Gridleak
Condenser ...50c
Add 5c for mailing

All Over the World

In nearly every country of every continent, from Bombay to Cape Town, from Madrid to Rio, from Sidney to Hawaii, G. A. Condensers are in service, replacing expensive fixed condensers or grid leaks and grid condensers. Many manufacturers use them as standard equipment on their apparatus. You To . . . — .



THE GENERAL APPARATUS COMPANY, Inc., 570-P West 184 St.
NEW YORK CITY

When writing to Advertisers please mention this Magazine

BURGESS "B" BATTERIES

SEVERAL
SIZES
FOR
SPECIAL
WORK



SEND FOR CATALOGUE
**BURGESS BATTERY
COMPANY**

HARRIS TRUST BLDG.-CHICAGO, ILL.

"B" Batteries

AN
**EVEREADY
PRODUCT**

Guaranteed 45 volts
Six Taps

**\$5.00 prepaid anywhere in
the United States**

We also build any type of set to
order. Send us your specifications.

Ets-Hokin & Galvan

Wireless Engineers

10 Mission Street San Francisco

Storage Batteries

are but one of several hundred radio accessories supplied by us. Order anything of standard make advertised elsewhere and get immediate delivery in a single package, that's SERVICE. Send stamp for details of SAVING you can make.



C-1 4 volt 20-40 amp hour.....\$ 7.25
C-2 4 volt 40-60 amp hour..... 10.75
C-3 6 volt 20-40 amp hour..... 10.75
Type "C" designed especially for lighting vacuum tube filaments. Supply limited.

T-1 4 volt 20-40 amp hour.....\$10.75
T-2 4 volt 40-60 amp hour..... 14.50
T-3 6 volt 20-40 amp hour..... 16.25
T-4 6 volt 40-60 amp hour..... 20.00

Type "T" designed for automobile trade are excellent for tube lighting.

F-1 6 volt 60 ampere hour.....\$19.00
F-2 6 volt 80 ampere hour..... 24.00

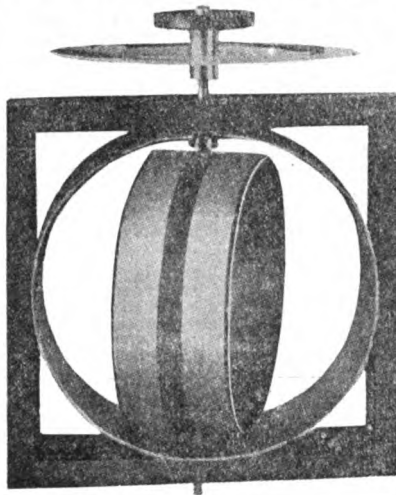
Type "F" designed for the new Ford car are also excellent for tube lighting or spark coil work.

Add 5 per cent excise tax to these prices which are FOB Marko factory Brooklyn, N. Y.

Mutual Purchasers Association

Dept. P-1-24 Stone St., New York

Here is an Unexcelled Value in a Variometer for Regenerative Work on Short Wavelengths



It is designed for use in plate and grid circuits and may be used either for cabinet mounting or otherwise. It is provided with a non-capacity aluminum dial and scale 5 inches in diameter, with a bakelite knob. Guaranteed to be the equal in working quality of any variometer on the market, or your money cheerfully refunded.

Send 15 cents in stamps for our catalogue, illustrating many other values equal to the above. All apparatus either in knock-down or finished form. Dealers write for trade discounts.

OARD RADIO LABORATORIES

"Your Ears Tell"
STOCKTON CALIFORNIA

-MARCONI INSTITUTE-

Conducted by the greatest and most experienced radio telegraph organization in the world.

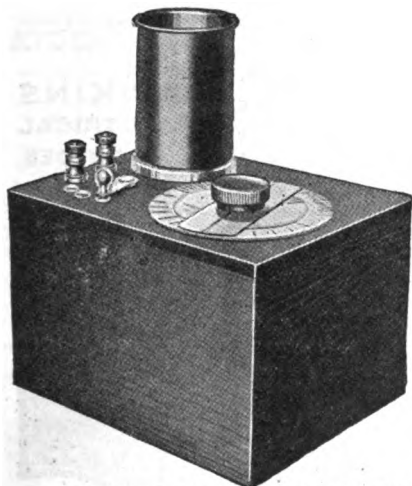
Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

335 New Call Bld., San Francisco



DOOLITTLE DECREMETER

A superior Wavemeter and a Decremeter in one instrument. Will enable you to adjust your station to the legal requirements and at same time improve the efficiency of your transmitter. PRICE \$25.00

Shipping weight 4 lbs.

F. M. DOOLITTLE CO.

157 Valley St. New Haven, Conn.

Our Specialty

Just the instrument you want at the right time. When no other dealer can supply you—we can. Our most complete stock and large buying power, coupled with economical methods, enables us to offer you everything in Radio at the time you want it and at very favorable prices.



BRANDES TELEPHONE RECEIVERS

2,000 ohm	\$ 7.00
3200 ohm	14.00
2800 ohm	10.00
1000 ohm (one phone only).....	2.75

WIRELESS BOOKS

We can supply you with any wireless book published. Wireless Press Books. Cole & Morgan Books. Consolidated Radio Call Book. All other radio books of value to the amateur.

Mail orders promptly filled. Send five cents for our new complete price list of all radio apparatus and parts today.

AMERICAN ELECTRO TECHNICAL APPLIANCE CO.

Dept. P. R.

235 Fulton Street

New York

GALENA TESTED CRYSTALS—Large Piece 25c
Radio Sales Co., 251 Duboce Ave., S. F.

WANTED

Amateurs to Secure Subscriptions

PACIFIC RADIO NEWS

Pacific Radio Pub. Co.
50 MAIN ST. SAN FRANCISCO

When writing to Advertisers please mention this Magazine

Audion Control Panel



With this panel the regular Marconi 4-prong bulb, an Audion-tron can be used. Same shipped to any part of the U. S. for \$6.50.

Grid Condensers, each	.....	\$ .35
Stopping Condensers, each	.....	.35
De Forest Coils, Form Wound (DL):		
No. .25 to 1500, Inc.	.....	\$1.65 to \$4.10
Radisco Coils:		
No. 40	.....	.70
No. 100	.....	.95
No. 175	.....	1.15
No. 325	.....	1.40
No. 550	.....	1.65
No. 750	.....	2.00
No. 1200	.....	2.65
Radisco Coils with Taps:		
No. 325-3	.....	1.70
No. 750-3	.....	2.30
No. 1200-3	.....	2.90

Agents for RADISCO Apparatus
KELLY & PHILLIPS
 Brooklyn's Wireless Store
 312 Flatbush Ave. Brooklyn, N. Y.

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

FOR SALE: Tuning cabinet with set of 12 honeycombs, \$65. If interested write for description and photo. E. BANCROFT, Sonoma, Calif.

FOR SALE: WIRELESS TRANSMITTING AND RECEIVING SET. 1/2 K. W. Transformer, Murdock Rotary Gap, 6 Section Murdock Condenser, mounted on asbestos frame. Holtz Cabbott phones. Remler audion panel and Bulb, storage battery, \$75.00. A. H. Schulz, 1445 Cole St., San Francisco.

FOR SALE OR TRADE: 1 KW Type R Thordarson Transformer. Want wireless instruments, also power tubes. Highest offer takes. No Junk. RUSSELL HUCKSTER, Sebanon, Indiana.

EXPERIMENTERS—Chemicals, chemical apparatus, books, sets, everything for the laboratory. Price list 5 cents. NATIONAL SCIENTIFIC SUPPLY CO., 241 Pa. Ave., Washington, D. C.

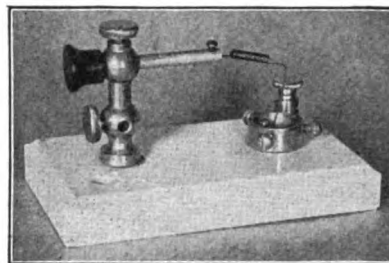
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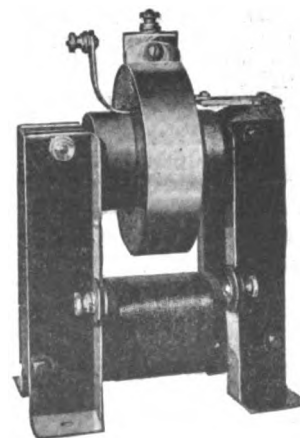
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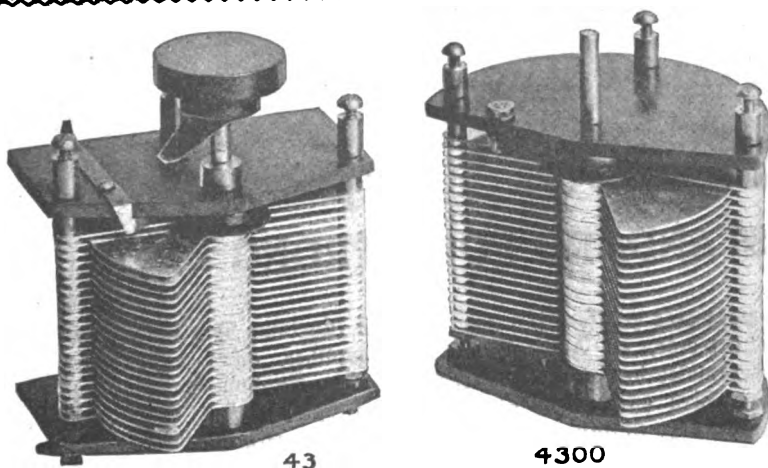
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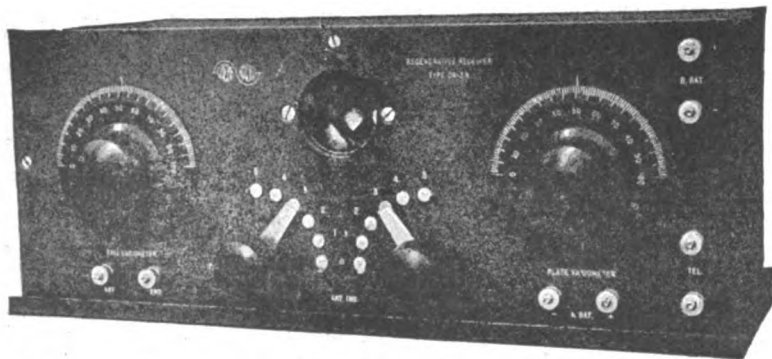
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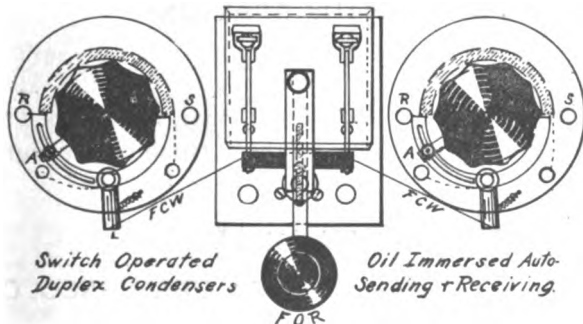
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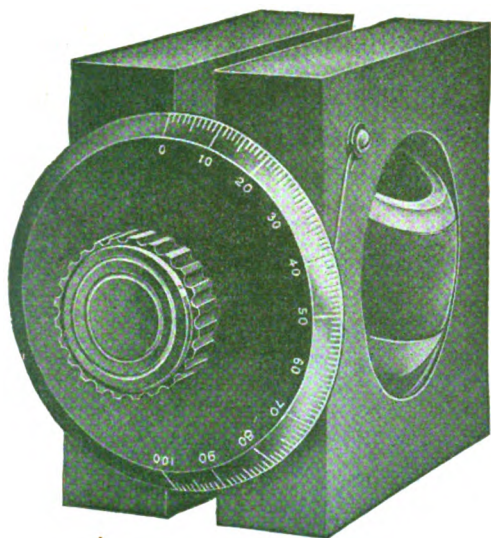
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Number 1D Variometer with dial \$8.50

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*Pioneer Journal of
Western Radio News and Development.*

warning!

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Distributors for the Moorhead Laboratories, Inc.

It Merits Your

Investigation

**Demand
Cunningham
Tubes**

**The Name is etched
on the glass**



Type C-300

**The Ideal
Amateur Tube**

\$5.00

Cunningham Audiotron Tubes WITH STANDARD FOUR PRONG BASE

THESE tubes embody all the knowledge and skill of many years research by the leading vacuum tube engineers. The New CUNNINGHAM TUBES are manufactured to rigid specifications in the world's largest vacuum tube factory. Quantity production by machinery makes possible the remarkable price.

Receiving tubes are of two general types. The high vacuum Navy type of rigid operating specifications for radio and tone frequency power amplification. Plate and filament adjustment are not critical. Detector properties are sacrificed to provide maximum amplification in multi-stage and complex circuits without distortion. An amplifying tube is necessarily an oscillator.

The gas content type designed for maximum signal audibility and sensitiveness in detector circuits.

CUNNINGHAM TYPE C-300

is of the latter class and its combination properties exceeded the expectations of its designers. The plate requires only 22½ volts—a single block cell. Maximum sensitiveness is always between

SEE YOUR DEALER TODAY and get your copy of Bulletin C-300 describing these new tubes. If your dealer cannot supply you send us his name and address and we will mail you a copy without charge.

Cunningham tubes are covered by patents dated 11-7-05, 1-15-07, 2-18-08, and others issued and pending. Licensed only for amateur or experimental uses in radio communication. Any other use will be an infringement.

Service and Quality since 1915

Guaranteed by

TRADING AS

AUDIOTRON MFG. COMPANY

35 MONTGOMERY ST., DEPT. N

SAN FRANCISCO

DEALERS-JOBBERS

You will be interested in my proposition on the new tubes with the standard four prong base, packed in attractive individual cartons. **DELIVERIES FOR 60 DAYS NECESSARILY IN ROTATION.** Write today for full details.

18-22½ volts. In addition to its wonderful detector properties, low B battery, quietness in operation, it functions as a tone frequency amplifier and is a free and persistent oscillator for regenerative amplification and CW reception. The pleasure and satisfaction from operating this tube cannot be described. Price

\$5.00

Cunningham Type C-301 High Vacuum Amplifier

is the most efficient and stable amplifier ever produced and meets the demand for the Navy type amplifier and regenerative receiver. The exhaust is carried to a high stage permitting operation at plate voltages from 40 to 100 with increasing amplification. Amplification constant 6.5-8 at 40 volts plate and 8-10 at 100 volts. Filament operates on 6 volts with rheostat. Try C-301 in your multi-stage amplifier with loud speaker. There is a surprise waiting for you. Price

\$6.50

When writing to Advertisers please mention this Magazine



SEND FOR OUR CATALOG

Ask Your Dealer To Show You Our Goods

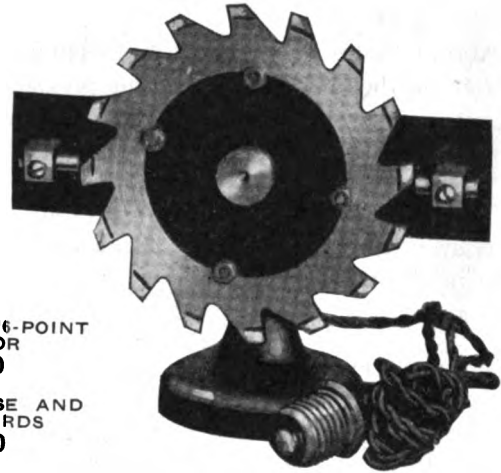
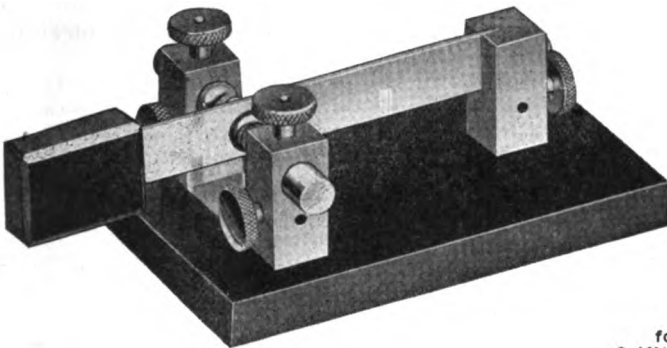


MANUFACTURERS—JOBBER—RETAILERS

ROTARY GAP No. YM-1

A new development in the rotary line has been made expressly for Young & McCombs. Improvements on the well-known saw tooth rotary wheel make this gap the equal in tone and efficiency to any selling for twice the money. It is the only gap on the market which will run smoothly and reliably in either a horizontal or vertical position. Can be run in a vertical position while screwed to the wall. Rotor is machined cast aluminum with formica center. Has liberal sparking space and is drilled for either 1/4 or 3-16 shaft. Variable motor speed switch in base.

PRICE—Completely Assembled—\$16.00



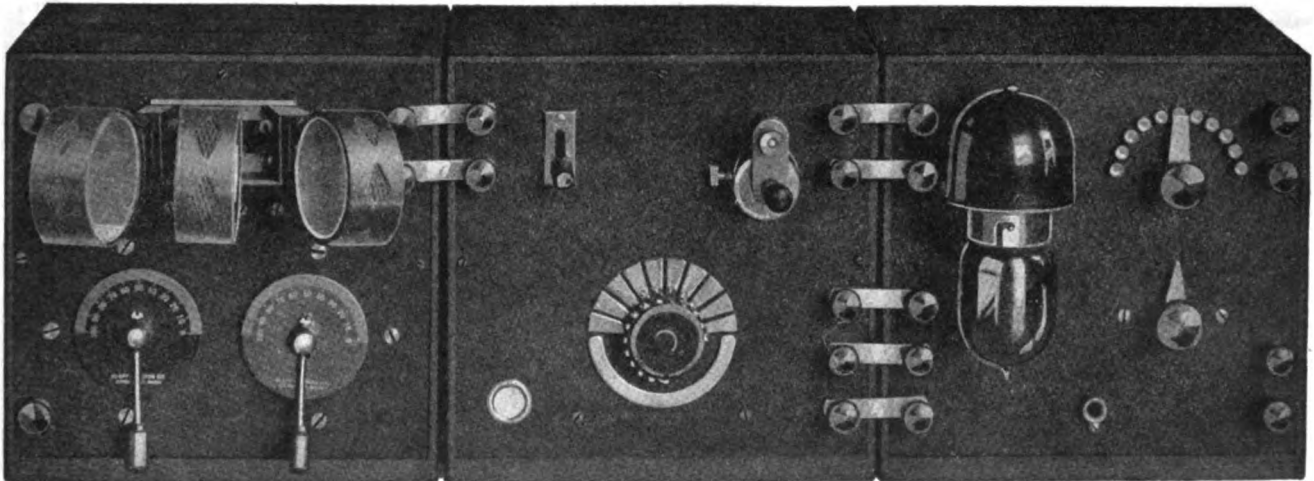
SAW-TOOTH 16-POINT
ROTOR
\$4.50

ROTOR BASE AND
STANDARDS
\$7.00

"COOTIE" KEY No. YM-6

The "Cootie" key is the snappiest sending device offered on the market for reliable spacing of characters. Large standards, formica knob, substantial silver contacts suitable for use up to 2 KW. The double action of the "Cootie" key lends an individuality to your sending. Price, Nickel-plated \$5.00.

UNIT SECTIONAL CABINET RECEIVERS



YM-7b

YM-9

YM-4e

A typical unit sectional cabinet receiver is here shown. We are the sole originators and designers of this type of receiver. Cabinets are of quarter sawed oak with "Early English" finish. Bakelite panels. Audion cabinet contains 60 volt variable "B" battery. This set, with proper honeycomb coils, is operative from 150 to 20,000 meters. Amplifiers may be added to these sets in any number. The crystal detector cabinet includes an enclosed buzzer and battery. All instruments can be supplied separately or in complete sets.

TUNERS
YM-7b—With plain mount.....\$29.50
YM-7a—With geared mount..... 32.50
(Less Coils)

CRYSTAL DETECTOR
YM-9 Complete with test buzzer
and battery\$24.50

DETECTORS-AMPLIFIERS
YM-4e Detector\$25.00
YM-6e Amplifier 31.00
(Less Bulbs)

WESTERN REPRESENTATIVE—LEO. J. MEYBERG CO., SAN FRANCISCO, CALIF.

When writing to Advertisers please mention this Magazine



The Recognized Symbol of Superior Performance

Amrad Radio Products enjoy distribution in every district of the United States and in Canada. They are recognized as the fastest growing line of quality radio apparatus on the market.

The dealers listed below are Amrad Dealers and have been carefully selected because of their experience in the radio field and their known reliability in

business. They are prepared to fill immediately from stock all orders for any advertised Amrad Product and, in addition, give **real Amrad Service** to operators everywhere.

Visit your Amrad Dealer. See for yourself the latest in radio design and let him help you meet your needs.

FIRST DISTRICT

C. B. Chase, 94 Railroad St., St. Johnsbury, Vt.
DeLancey Felch & Co., South Lancaster, Mass.
F. D. Pitts, Co., 12 Park Square, Boston, Mass.
Rhode Island Electrical Equipment Co., 45 Washington St., Providence, R. I.
Smith & Emerson, 18 Church St., Pittsfield, Mass.

SECOND DISTRICT

American Electro Technical Appliance Co., 235 Fulton St., New York City.
Continental Radio & Electric Co., 6 Warren St., New York City.
Westchester Electric Appliance Co., 253 South Broadway, Yonkers, N. Y.

THIRD DISTRICT

Philadelphia School of Wireless Telegraphy, Parkway Bldg., Philadelphia, Pa.
Shotton Radio Manufacturing Co., Box 3, Scranton, Pa.
Meeks-Collins Electric Co., 411 Granby St., Norfolk, Va.

FOURTH DISTRICT

Carter Electric Co., 63 Peachtree St., Atlanta, Ga.

FIFTH DISTRICT

Hurlburt-Still Electrical Co., Capitol Ave. & Fannin St., Houston, Texas.

Nola Radio Co., 143 Chartres St., New Orleans, La.
Southwest Radio Supply Co., Dallas, Texas.

SIXTH DISTRICT

Arno A. Kluge 638 S. Figueroa St., Los Angeles, Cal.
California Electric Supply Co., 643 Mission St., San Francisco, Cal.
Western Radio Electric Co. 550 South Flower St., Los Angeles, Cal.
Southern Electrical Co., Third & E Streets, San Diego, Cal.

SEVENTH DISTRICT

Glasgow Electric Shop, Orpheum Bldg., Glasgow, Montana.
Northwest Radio Service Co., 609 4th Ave., Seattle, Wash.

EIGHTH DISTRICT

Radio Electric Co., 4416 Henry Street, Pittsburgh, Pa.
Barker Fowler Electric Co., 114 North Grand Ave., Lansing, Mich.
McCarthy Bros. & Ford, 75 W. Mohawk St., Buffalo, N. Y.
Northern Radio Laboratory, 111 Main St., Clyde, Ohio.
H. L. Walker Co., 185 Jefferson Ave., East, Detroit, Michigan.
Radioelectric Shop, 919 Huron Road, Cleveland, Ohio.
Rudolph Schmidt & Co., 51 Main St., East, Rochester, N. Y.
Precision Equipment Co., 2437 Gilbert Ave., Cincinnati, Ohio.

NINTH DISTRICT

Central Radio Co., Inc., Central Bank Building, Independence, Mo.
Chicago Radio Apparatus Co., 3400 S. Michigan Ave., Chicago, Ill.
Cosradio Co., 1725 Fairmont Ave., Wichita, Kansas.
C. E. Goddard, Shawnee, Kansas.
Klaus Radio Co., Eureka, Ill.
Linze Electrical Supply Co., 1129 Olive St., St. Louis, Mo.
Tafel Electric Co., 236 W. Jefferson St., Louisville, Ky.
U. of I. Supply Store, Champaign, Ill.
Great Lakes Radio Supplies Co., Inc., First National Bank Bldg., Elmhurst, Ill.
Young & McCombs, Rock Island, Ill.

CANADA

Scientific Experimenter, Ltd., 33 McGill College Ave., Montreal.
Scientific Experimenter, Ltd., Dominion Building, Vancouver, B. C.
Scientific Experimenter, Ltd., 410 Confederation Life Bldg., Winnipeg, Manitoba.
Scientific Experimenter, Ltd., 93 King St., East, Toronto, Ontario.
Scientific Experimenter, Ltd., 1 Arcade Bldg., Hollis St., Halifax, Nova Scotia.
Scientific Experimenter, Ltd., Board of Trade Bldg., St. John's, Newfoundland.
The Vaughan Electric Co., 94 Germain St., St. John, New Brunswick.

In most cases your dealer can supply you with the latest Amrad Bulletins. If not, write us. If an Amrad Dealer does not happen to be in your immediate vicinity send us the name of your nearest dealer and we will be pleased to send you the up-to-date Amrad Catalog.

AMERICAN RADIO AND RESEARCH CORPORATION

Address all Communications to New York Office

2420 Park Row Bldg.
New York

Factory and Laboratory
Medford Hillside, Mass.

When writing to Advertisers please mention this Magazine

ARE YOU GOING TO BE Satisfied With Obsolete Apparatus

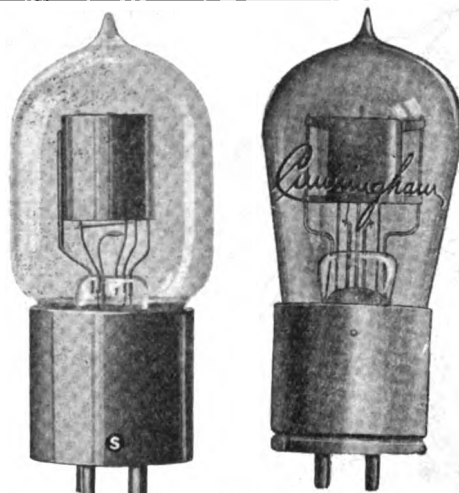
or are you going to start the new year with something new
Let Us Give You a Vacuum Tube Free of Charge!

Read this Remarkable Offer and see how easy it is for you
 to improve your equipment without any added expense

HERE IS THE OFFER:

Get four of your radio friends to subscribe to "Pacific Radio News" for one year. Send us eight dollars for these four subscriptions and 25 cents for mailing charges. We will promptly send you a vacuum tube absolutely free of charge. If you cannot get four individual subscriptions, get two of your friends to subscribe for two years each. These tubes will also be awarded to you if you subscribe as an individual for four years. If you are already a subscriber you can extend your subscription for four years. In short any combination for which you send us eight dollars will be accepted. All tubes are new and genuine and fully guaranteed by the manufacturer

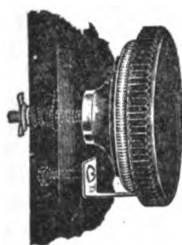
HERE ARE THE TUBES:



When ordering specify whether you want an A.P. V.T. Detector, Oscillator or Amplifier tube or the new Cunningham Audiotron.

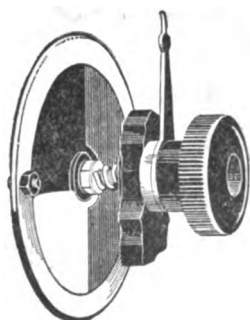
YOU SAVE FROM FIVE TO SEVEN DOLLARS ON THIS OFFER

HERE IS ANOTHER OFFER ON WHICH YOU SAVE FIFTY PER CENT



These instruments retail at one dollar each. Add 10c for postage.

THE PARKIN PANEL MOUNTING RHEOSTAT OR THE NEW PEN BRAND GRID CONDENSER GIVEN FREE WITH ONE SUBSCRIPTION TO "PACIFIC RADIO NEWS."



THE NEW PARKIN .001 VARIABLE CONDENSER GIVEN FREE WITH A TWO-YEAR SUBSCRIPTION TO "PACIFIC RADIO NEWS" OR TWO INDIVIDUAL SUBSCRIPTIONS. REGULAR PRICE, \$2.00. All 10 cents for postage.



DOUBLE VALUE FOR YOUR MONEY—PLAIN AS DAY-LIGHT.

NOW IS THE TIME TO SUBSCRIBE! MAIL THE COUPON TODAY.

PACIFIC RADIO PUB. CO.
 50 MAIN ST.
 San Francisco

Herewith is

\$.....and..... cents for mailing charges for which you will send "Pacific Radio News" for..... years to:

Name.....

Address.....

You will also promptly send the following apparatus as a premium for the above subscription.

SUBSCRIPTION RATE, \$2 PER YEAR

Signals

The First Americans used to signal with smoke clouds
as far as they could see.
Modern Americans now communicate around the world
by invisible electric waves.

Whether dots and dashes, or spoken words convey the message, it is the **AMPLIFIER** which makes long distance radio service possible,—by the mere turning of a switch, you can bring those trans-ocean stations to your ears like magic,—or you can sit back and listen to local stations with your telephones lying on the table.

**AND WHEN YOU GET YOUR
AMPLIFIER, GET IT FROM THE
AMPLIFIER SPECIALISTS.**

The “**SUPERADIO**” Detector and Single Stage Amplifier, with the new Filament Temperature Indicator.

\$45.⁰⁰

The “**SUPERADIO**” Two-stage Amplifier, with the new Filament Temperature Indicator,

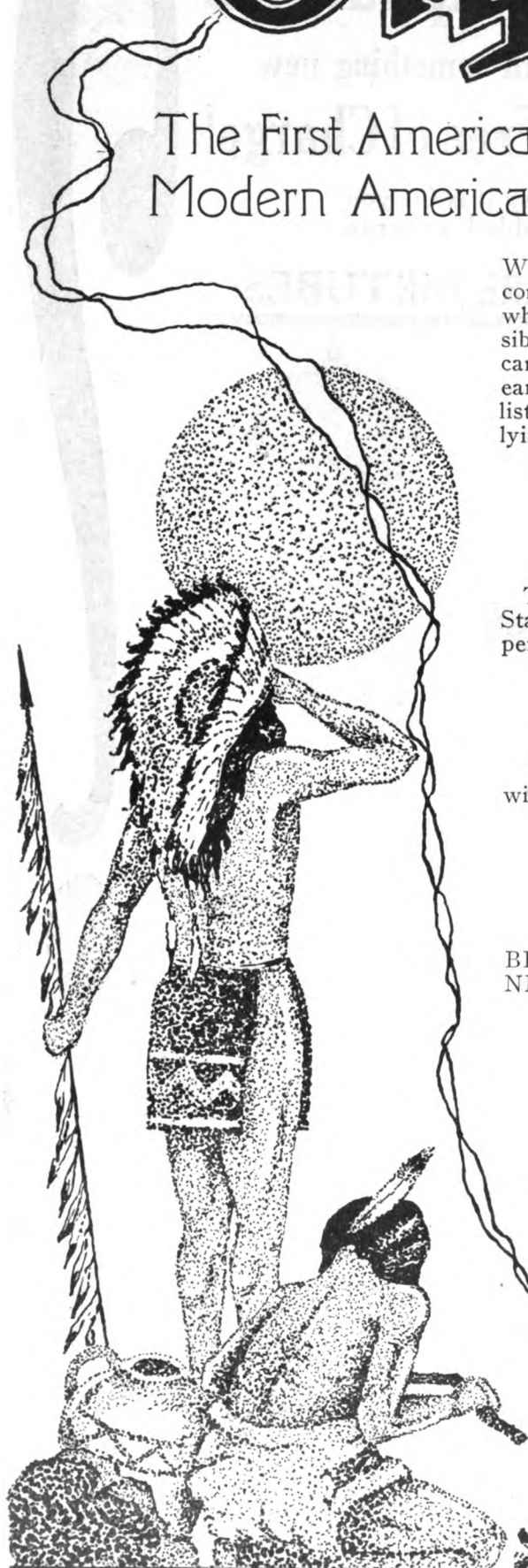
\$55.⁰⁰

The “**SUPERADIO**” Amplifiers are the **BEST. GET THE BEST FIRST, AND NEVER REGRET.**

Write for Bulletin 110.

SUPERADIO

**CORPORATION
2674 BAILEY AVE.
NEW YORK
SUCCESSORS TO —
L.M. COCKADAY & CO.**



PACIFIC RADIO NEWS

PAUL R. FENNER
Editor

H. W. DICKOW
Advertising Manager
50 Main St., S. F., Cal.

February issue forms
close on January 1st.

RADIOTORIAL
BY THE EDITOR

PUBLISHED MONTHLY

Subscription Rate
\$2.00 per year in
the U. S.
\$2.50 in Foreign
Countries

Copyright, 1920
Pacific Radio Pub. Co.

The Backbone of a Radio Journal

MANY people engaged in radio work are denouncing the radio publications that contain a large volume of advertising. "Nothing but ads," was the phrase we overheard at a local radio store recently when a prospective purchaser of a radio journal refused to buy either of the four publications on display. If this person would only stop to think that without the ads there would be no radio publications, he would not have made the aforementioned absurd remark.

Advertising, from a timid, fumbling idea, has become not only a science but a business. It has grown large, prosperous and necessary, and without its aid the wheels of modern industry would not spin and the needs of the public would not be so easily answered.

As the advertising of a publication increases the amount of reading matter also increases. Some publications can run a lifetime without an inch of advertising but the story is a different one when applied to radio journals. Not fifty years ago one of the large National monthlies refused \$17,000 for an advertisement of a certain new household necessity. What would the average amateur radio station look like today if the owner had not patronized the advertisers of one radio journal or another?

Do you think for a moment that long distance amateur communication would be possible without the aid of the radio manufacturer in giving us what we need to accomplish the present day unusual feats? Therefore, in order to publish new ideas for the construction of modern radio equipment and bring these

High and Dry

In response to advertisements published in several Eastern radio periodicals last month we were swamped with requests for free copies of our Convention and Christmas number.

As stated in these advertisements the supply of copies was limited, and several hundred requests for copies could not be granted.

We have therefore printed an extra thousand copies of the current issue, substituting it for the Christmas number, and all orders for free copies will be promptly filled.

ideas into your station, you must read the latest radio publications and these publications would not reach your station were it not for the advertising that they contain.

Advertising, like all other useful bodies, has its troubles. Its strength lies in its healthy, constructive qualities, but many of us have learned that it can also be used for destruction.

The work of the honest advertiser is injured by the advertiser who exaggerates or deliberately swindles. And the first need of the honest advertiser is to see that the streams of publicity are kept clean—and that the public is not deceived. The various Representatives of "Pacific Radio News" have instruc-

tions to take particular care when accepting advertising and we do everything possible to see that nothing but truthful advertising enters our columns. If a publication sells its space freely to all sorts of doubtful schemes, it becomes a fellow-conspirator against the public and merely shares in the loot of robbery. It turns over its readers, bound and gagged, to be stripped by swindlers, and it hurts the entire community.

Many radio amateurs can relate a tale of woe as to how they were "jipped" of their hard-earned dollars. In order to crush this unlawful practice we will ask those who are experiencing difficulty in their dealings with radio manufacturers to write us and the proper steps will be taken to curb this state of affairs.

A new organization will soon be introduced to the radio public—The National Association of Radio Dealers, now being established in Omaha, Nebraska. This Association is being formed to give the amateur radio man a square deal in the purchase of his apparatus. It will soon be a great organization. Manufacturers of radio apparatus should not take its purpose lightly. The co-operation of "Pacific Radio News" is pledged in the good work of the Association—we have already been advised that our application for membership has been accepted. The Association will carefully examine the advertising printed in radio journals and protect the amateur in every possible manner—it will create a spirit and a movement that will make the radio business as clean and trustworthy as it must be if it is to continue its growth and usefulness.

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1306 Hartford Bldg.

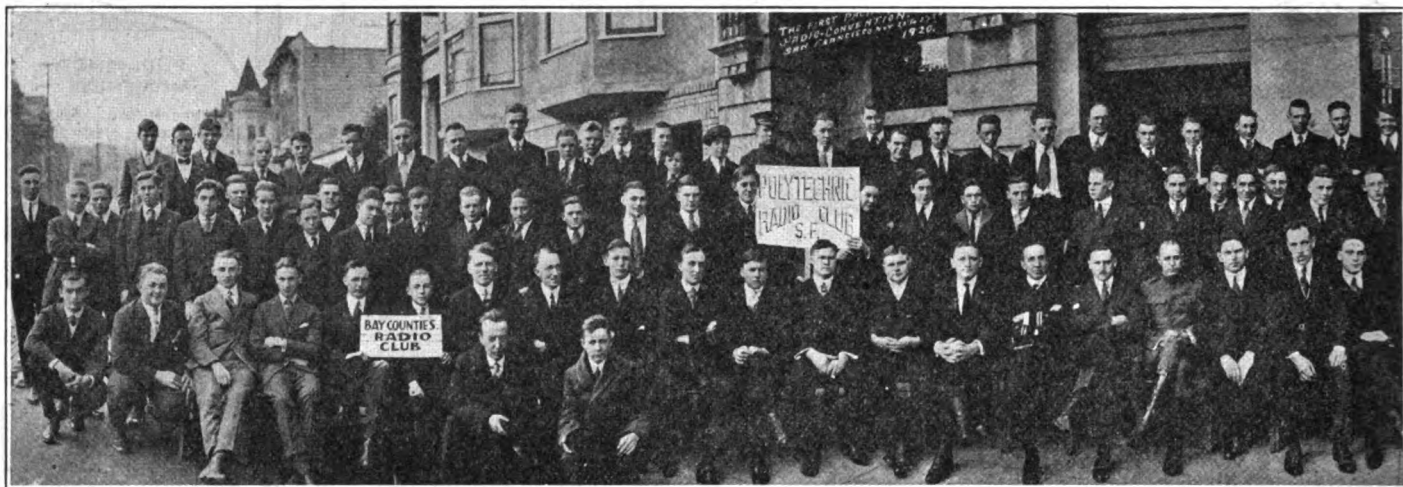
Seattle Office.....419 Pioneer Bldg.
London Office.....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

Radio Convention is Great Success

Major J. F. Dillon is Made Permanent Chairman.

Pacific Coast Advisory Council is Formed.



The photograph on this and the accompanying page shows approximately one-third of the delegates and radio men who attended the big convention

THE Pacific Coast Radio Convention opened at 10:28 a. m. with the playing of the "Star Spangled Banner" transmitted by radio telephone from the California Theater. The audience consisted of 580 radio men. The opening address was read by the secretary to Mayor Rolph of San Francisco and outlined the importance and significance of the radio convention. The secretary then closed his address with the introduction of Mr. H. W. Dickow, president of the San Francisco Radio Club. The address and introduction was accomplished by radio telephone and loud speaker from the California Theater.

Mr. Dickow then addressed the convention, on behalf of the San Francisco Radio Club, and welcomed all the delegates and visitors, and closed by introducing Mr. Lufkin, chairman of the convention committee.

Mr. Lufkin outlined the entire plans for the convention, welcomed the attending radio men, and turned the convention over to Major J. F. Dillon, United States radio inspector, and who was the honorary chairman of the convention.

Mr. Dillon gave a brilliant talk on the possibilities of the convention, especially in the way of opposing bad legislation on controlling radio transmission, and gave a very comprehensive outline of the work done by the United States Department of Commerce for radio advancement. Mr. Dillon then concluded with words of praise for those who made the convention possible. His speech was met with the heartiest applause of the day.

The honorary chairman then called for

a report from the credentials committee to find which organizations were entitled to seats in the convention. Chairman Tinsley, Mr. D. B. McGown and Mr. L. E. Grogan of this committee reported that all radio clubs should be seated that presented credentials. Seventeen radio clubs were officially seated. The committee refused seats for the Pacific Radio Supplies Company, "Pacific Radio News" and the Leo J. Meyberg Company for the reason that no sales or commercial organization should be entitled to a vote. A harsh protest was voiced to this statement. A vote was taken and popular sentiment showed that every willingness was evident to permit manufacturers of amateur apparatus, and especially the "Pacific Radio News," to have seats in the convention. The "Pacific Radio News" was lauded and declared to be the greatest medium of the West and entitled to a seat, even though manufacturers were barred. A great applause met this statement. An official amendment was then made to the report of the credentials committee by Mr. Tinsley, and "Pacific Radio News," Leo J. Meyberg Company, and the Pacific Radio Supplies Company were given seats, with six votes to each.

The credentials committee then reported that all recognized organizations were to be given six votes each.

The honorary chairman, Mr. Dillon, then introduced the following men, who gave talks on the convention and other topics of interest: Mr. C. I. Hoppough, radio engineer for the Signal Corps, U. S. Army; Mr. B. Wolf, Pacific Coast radio supervisor for the United States

Shipping Board; Mr. C. Langevin, Pacific Coast representative for the United Radio Telegraphers' Association; Mr. L. Malarin, of the Radio Corporation of America; Mr. Leo J. Meyberg, of the Leo J. Meyberg Company; Mr. Colin B. Kennedy, of the Colin B. Kennedy Company; Mr. A. E. Bessey, one of California's most prominent and enthusiastic amateurs; Mr. Pray, of the North Dakota Radio Association; Mr. Blake, of the Federal Telegraph Company; Mr. Kuhn of the Ship Owners' Radio Service; Lieutenant Twist, of the Naval Radio Service, and many other prominent radio men.

The next transaction of the convention was the nomination and election of a resolutions committee. Mr. H. W. Dickow was elected as chairman of this committee, and the chairman of each delegation was appointed as one of the resolutions committee. A recess of twenty minutes was called by the honorary chairman to allow the resolutions committee to transact its business.

Following the recess, Sergeant Lufkin read a telegram from the National Radio School of Washington, D. C., wishing the convention success.

Chairman Dillon then called for a report of the resolutions committee. Chairman Dickow of this committee read the resolutions. The first resolution was to make the radio convention an annual affair. Another resolution was introduced to appoint a chairman for the next year's convention, a man who is not affiliated with any commercial enterprise in the radio field. Nominations were: Major Dillon, Mr. Linden and Mr. McGown. Major Dillon was elected

580 Radio Men in Attendance

Twenty-six Organizations Given Six Votes Each.

Sixteen Radio Clubs Represented.



The foremost radio man and the humblest amateur were given equal voting power at the convention

by a tremendous majority and amidst a loud applause.

Mr. Dickow read a resolution, introduced by the Pacific Radio Publishing Company, to protest the passage of the new proposed radio act to regulate radio communication. The "Pacific Radio News" was the only publication which published the entire bill in its columns. A protest was drawn up and every attending radio man was asked to sign and the protest was to be sent to the Congressman from California. This resolution met with a roar of applause, and was unanimously accepted and members and friends signed the protest.

The third resolution was introduced by the Bay Counties Radio Club and read by the chairman of the resolutions committee, Mr. Dickow. This resolution called for a certain signal to be transmitted before beginning transmission in order to ascertain if other stations were listening for a message. This resolution met with a great deal of counter argument and the figure "4" was finally adopted by the delegates.

Another recess of twenty minutes was called. A photograph of all delegates to the convention was taken in front of the convention hall during this interim.

The next resolution was introduced by the San Francisco Radio Club, Inc., and was to form a committee of six to act as an advisory council to mediate, arbitrate and settle all questions relating to radio which would be brought to its attention. The council was to meet four times a year in San Francisco, Calif. The members of this council were named United States radio inspector for

the Sixth Radio District, Pacific Coast radio supervisor for the United States Shipping Board, United States district communication superintendent for the Pacific Coast Naval District, United States chief signal officer for the United States Army, Western Department, United Radio Telegraphers' Association representative for the Pacific Coast Division, and the chairman of the board of directors of the San Francisco Radio Club. The second part of the resolution called for the establishment of a Pacific Coast Radio League, with "Pacific Radio News" as official organ. There was a decided protest on the latter half of this part of the resolution and it was defeated two to one. The resolution was then passed with the amendment that the American Radio Relay League representative of the Pacific Coast District be appointed on the advisory council instead of the chairman of the board of directors of the S. F. R. C.

Mr. Dickow then praised Mr. Dillon, honorary chairman of the convention, on the excellent manner in which he carried on the convention, and thanked Sergeant Lufkin for the untiring efforts he made on the convention work. He then concluded with a wish that all delegates and visitors to the convention have a capital good time at the radio show, banquet and ball which was to follow.

Mr. Lufkin thanked the committees that worked for the good of the convention in behalf of all present.

Major Dillon then closed the convention with the statement that any small difficulty that might have arisen, or any

point not fully covered by this convention, was to be overlooked by those affected, and everyone left with a sense that the first Pacific Coast Radio Convention was a great success. Adjournment was at 2:30 p. m.

THE RADIO BALL

ART HICKMAN'S jazz music from the St. Francis Hotel was carried to the radio ball at the Century Club on November 27th and amplified by means of a DeForest receiving equipment and a magnavox.

The dancers were given a treat in the form of a distinctive radio program. Herewith is a list of the radio dances:

1. Oscillating Fox Trot.
2. Amplified One Step.
3. Atmospheric Waltz.
4. Static Fox Trot.
5. Modulation Waltz.
6. Radiation One Step.
7. Frequency Fox Trot.
8. Synchronous Waltz.
9. S. O. S. Fox Trot.
10. Conventional One Step.
11. Electron Fox Trot.
12. Quenched Gap Waltz.

EXTRAS

1. The Alternating Special.
2. The Ether Waltz.
3. Loose Coupled Waltz.

THE RADIO BANQUET

A SEVEN-COURSE chicken dinner greeted the anatomies of the visiting delegates to the convention. One hundred reservations were made and one hundred constitutions were replenished with sufficient food to hold them over for another year. Radio speeches and



The center of attraction at the wireless show was the U. S. Navy exhibit. A complete radio compass station of the latest type was in constant operation. By means of a radio telephone equipment of the type used on many vessels of the navy, constant telephonic communication was carried on with nearby stations. Other apparatus on display included the new Navy Standard short and long wave receivers, audion control panels, loud speakers, emergency transmitter and a set of storage batteries for driving the dynamotor that supplies current to the radio telephone set. The U. S. Navy exhibit occupied one-half of the stage in the convention hall, while the other half was devoted to the U. S. Army. Among the exhibits displayed by the army were the following: Field set for telegraphic and telephonic communication, standard army pack sets, vacuum tube equipment, and an interesting collection of photographs of army radio installations.

jokes were delivered by more than twenty of the diners. Major J. F. Dillon, Sergeant Willard E. Lufkin and Mr. Dwight E. Lyon were the honored guests of the affair. Mr. Lyon spoke on truthful and honest radio advertising in the radio publications and congratulated the manufacturers on the manner in which they are carrying on their work.

First grade amateur licenses were issued at the Radio Show of the convention by the radio inspector of the Sixth Radio District to the following:

Lew Torrey, 3820 High street, Oakland, Calif.

Russell A. Hallon, 437 Walnut street, San Francisco.

Ernest M. Carr, 316 Presidio avenue, San Francisco.

John W. Barrett, 900 Jackson street, San Francisco.

Arthur M. Herren, Eighth Service Company, Signal Corps, Presidio, San Francisco, Calif.

Carl J. Penner, 1076 Aileen street, Oakland, Calif.

Paul J. Wing, 1040 Fifty-sixth street, Oakland, Calif.

Alfred G. Hibbard, 1701 Gough street, San Francisco, Calif.

Sterling Winters, 659 Clayton street, San Francisco, Calif.

Wm. W. Scamell, 1033 Excelsior avenue, Oakland, Calif.

Arthur L. Bolton, Jr., 1700 La Loma

avenue, Berkeley, Calif.

Burton Cole, Los Gatos, Calif.

Herbert C. Hand, Carmel, Cal.

Chas. M. Dunn, 320-A Guerrero street, San Francisco, Calif.

RADIO organizations who were awarded six votes each by the credentials committee of the convention:

San Francisco Radio Club, Inc.

Bay Counties Radio Club.

Polytechnic Radio Club.

Reno, Nevada, Radio Club.

University of California Radio Club.

North Dakota Radio Association.

Santa Cruz Radio Club.

Lowell High Radio Club.

American Radio Relay League.

Monterey Radio Association.

Technical Radio Club, Oakland.

Stockton Radio Club.

Pomona Radio Association.

Sacramento Radio Club.

Napa Radio Club.

Federated Malay States Government.

Evening High School Radio Club of San Francisco.

"Pacific Radio News."

Leo J. Meyberg Company.

The United States Army.

The United States Navy.

The United States Shipping Board.

Department of Commerce.

United Radio Telegraphers' Association.

Knights of Columbus Radio Club.

Pacific Radio Supplies Company.

Delegates from all of these organizations were present.

THE exhibit of the Colin B. Kennedy Company at the recent wireless show in San Francisco called forth much favorable comment from the visitors at the exposition, both on account of the attractiveness of the display and because of the high quality of the apparatus shown. Eastern visitors were heard to exclaim in surprise at the high standard exhibited by apparatus of Pacific Coast manufacture, and one remarked that nothing produced in the East could surpass the thorough-going, high quality, characterizing Kennedy receiving equipment. Westerners in general, and Californians in particular, may well be proud of possessing factories producing such apparatus.

The Colin B. Kennedy Company, whose exhibit is shown in the illustration above, was recently incorporated under the laws of the state of California after existing for some time as an individual enterprise. With its incorporation, the company acquired additional engineering personnel and manufacturing facilities. In the reorganization of the company, Colin B. Kennedy, founder of the original concern, was made president; Harry J. Rathbun, vice-president; Nathan A. Bowers, secretary, and Emile A. Portal, treasurer. These men, with Dr. Leonard F. Fuller, constitute the board of directors. Mr. Kennedy has

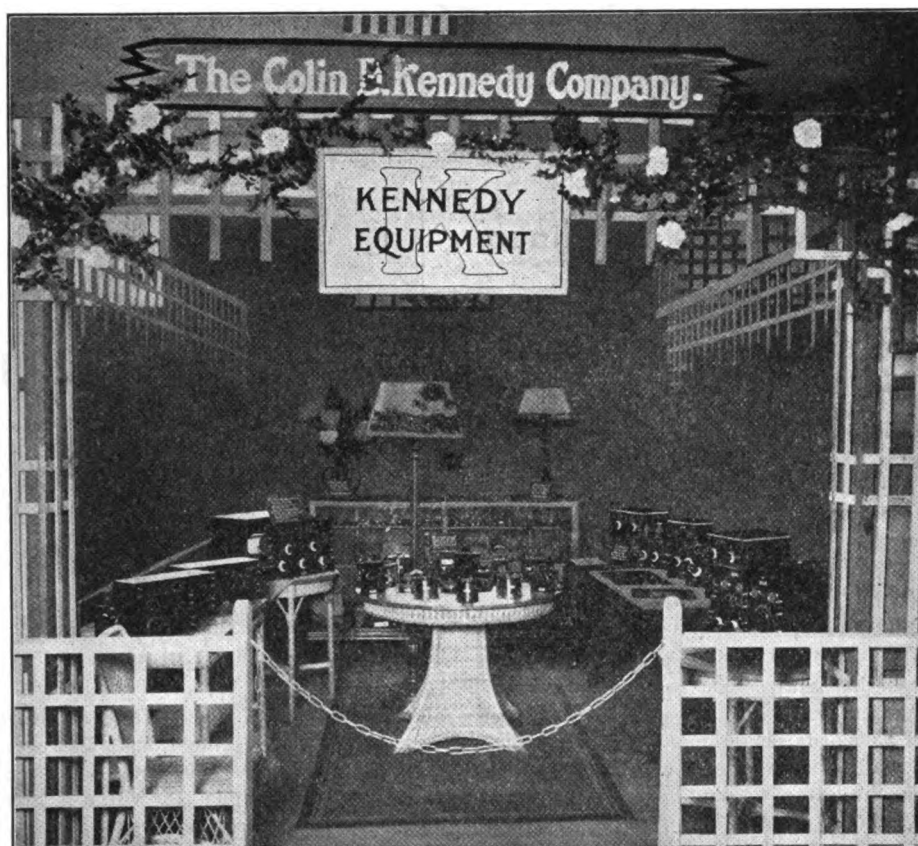
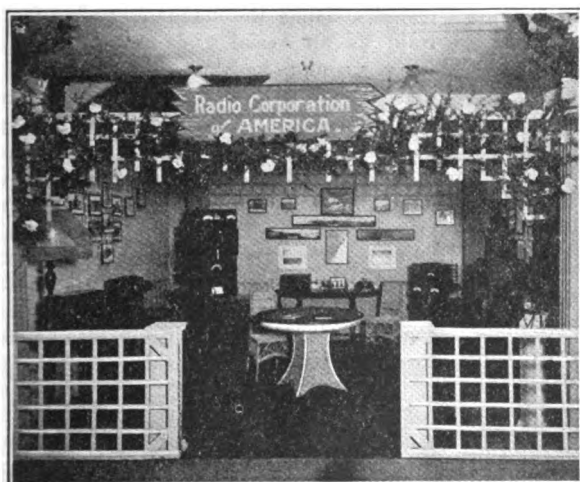


Exhibit of Colin B. Kennedy

spent most of his life in various phases of the art of communication, with the British Pacific Cable Company, the Canadian government radio service and the Federal Telegraph Company. Mr. Rathbun was also connected with the engineering department of the Federal Telegraph Company in various executive capacities for several years during the progress of the design and development of the equipment for the chain of high power transmitting stations for the U. S. Navy. Mr. Bowers has been for the past six years Pacific Coast editor of the McGraw-Hill technical publications. Mr. Portal joined the organization from the

research staff of the National Radio Company after serving in the naval radio service, following many years as an associate with Professor Charles D. Herrold in radio research. Dr. Fuller was Chief Electrical Engineer of the Federal Telegraph Company during the period, covered by the development of the modern Federal-Poulsen arc transmitters of both high and low power, ranging from two kilowatts to one thousand kilowatts. He is too well known the world over as a radio engineer to require further mention here.

The Colin B. Kennedy Company maintains its offices and display rooms in the Rialto Building, San Francisco.



Booth of the Radio Corporation of America

Herein was displayed not only the modern commercial installation, but also the apparatus used in the pioneer days of radio. An aeroplane equipment, manufactured by the Corporation, was another display of unusual interest.

AN OSCILLATING ODDITY

The Answer to the Contest Held by the Pacific Radio Supplies Company at the Wireless Show

By B. F. McNamee, Research Engineer, Pacific Radio Supplies Company.

A curious oscillating valve circuit was shown in operation in the booth of the Pacific Radio Supplies Company at the San Francisco Wireless Show, and prizes were offered for the two best written explanations. Following are the winners:

Homer G. Tasker, 2015 Hearst avenue, Berkeley, Calif.

Earl R. Meissmer, 2329 Carlton street, Berkeley, Calif.

An Electron Relay was awarded as a prize to both of the winners.

For the benefit of those who did not have the good fortune to attend the show, the following account of the circuit and its action is given. The circuit used is shown in Fig. 1. C is a condenser of .1 mf. capacity. P and S are the primary and secondary respectively of an audio-frequency amplifying transformer. Although

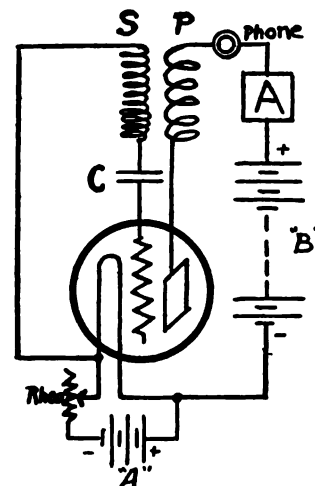


Fig. 1

the transformer used was of the air-core type, one with an iron core would do. The telephone receiver used was of the usual high-resistance type (about 1,000 ohms). The meter was a Paul Unipivot micrometer having a full scale reading of two-tenths of a milliamper. The circuit would, of course, operate without the meter and the telephone, both of which were used to indicate the action of the circuit. The valve was an AP amplifier, which has a very high vacuum. The "B" battery was about 60 volts, but might have been anything from 15 to 500 volts. The needle of the meter showed a gradual increase of plate current from nearly zero to about 60 microamperes, taking four or five seconds to do so. Then a very quick swing of the needle showed a sudden increase of plate current from about 60 to about 140 microamperes. This sudden increase was accompanied by a high-pitched note of short duration in the telephone. The needle swung back to zero just as

(Continued on page 180)

WORLD'S RECORD FOR FAST RADIO RECEPTION IS BROKEN AT THE CONVENTION

A. E. Gerhardt copies over forty-nine words per minute for a period of more than four minutes

M. L. HART, U. S. N., TAKES SECOND PLACE

THE world's record for fast reception of radio signals was broken by A. E. Gerhardt at the wireless show of the Pacific Coast Radio Convention on November 28, 1920. Gerhardt copied forty-nine and a quarter words per minute for four consecutive minutes, with but five errors. A Wheatstone transmitter was used for the contest and messages of ten words in length were sent.

Gerhardt is employed by the Radio Corporation of America at the high power station, Marshall, Calif.

He succeeded in winning second prize at the speed contest of the recent exposition in San Francisco, but he is now the uncrowned king of the radio code.

Major J. F. Dillon, local United States radio inspector, was the judge of the contest. The prize awarded to Mr. Gerhardt was a silvered electric shaving mirror.

M. L. Hart, chief electrician, radio, U. S. N., won favorable mention by maintaining the same speed, but not with the same accuracy.

Gerhardt also won first place in copying ten letter code messages at a speed of 33 words per minute.

An amateur speed contest was held on the same evening.

Perfect copy at a speed of 25 words per minute was handed to the judge of the contest by M. S. Ayres of San Francisco. He was awarded a pair of 2,200



"Tony" Gerhardt

ohm receiver as a prize. The receivers were donated by the local DeForest Company. Mr. P. Friedental took second prize. He copied 25 words a minute with but three errors. He was awarded a Radio Shop variometer, donated by the Radio Shop of San Jose, Calif.

LATEST IN RADIO AUTOMOBILES



Fred W. Swain and Wilbur Cramer are credited with this unique auto equipment. The center photo shows the elaborate receiving set being operated by Wilbur Cramer.

WHEN Wilbur R. Cramer and Fred W. Swain, 2916 North Sixteenth street, Omaha, Neb., take their evening ride in their automobile they can chat with their friends by wireless telephone. The equipment shown in the accompanying photographs is the apparatus with which they have been experimenting for the last several years. It is attached to their automobile, as shown, and can be operated while traveling.

Their experiments with amateur wireless telegraphy began four years ago while they were attending the Omaha

High School. Following the completion of their courses, both men continued their intensive study and have several inventions already in operation.

Another channel for their wireless efforts will be the conveying of orchestra music from one Omaha motion picture theater to another, and the transmission of a speech from a nationally known suffrage worker while in Chicago to one of these theaters in Omaha.

The Pathe News Service, Kinograms, and Selznick News have taken about two hundred feet of motion pictures of their apparatus while in operation.

HOW WOULD YOU LIKE AN OLD-TIME RELAY BY 9XE?

MR. W. KIRWAN, sales manager of TRESKO, is arranging for an "old-time relay" by 9XE. He expects to get a message from President-elect Harding and deliver it to every state in the Union. It is his desire to have it delivered by amateur radio to Hawaii and Alaska. CW and phone sets will be a feature of the relay. Further details will be published in our next issue.

WHILE traveling by train from New York to Boston, one of the staff of the American Radio and Research Corporation enjoyed a novel experience with the use of an Amrad crystal detector. Using the baggage rack of the train as an aerial and the steam pipe for a ground, he was able to hear signals from stations many miles distant. An extensive line of new receiving apparatus is in the process of manufacture by the Amrad Corporation, of which the crystal detector referred to above is one unit.

Actions speak louder than words! Write a firm protest against the passage of S4038 to your Congressman before you lay this issue aside.

Hit the iron while it's hot. Fight for your rights as an amateur radio operator. Tell your Congressman to 'help' defeat Bill S4038.

Arc Radio Apparatus

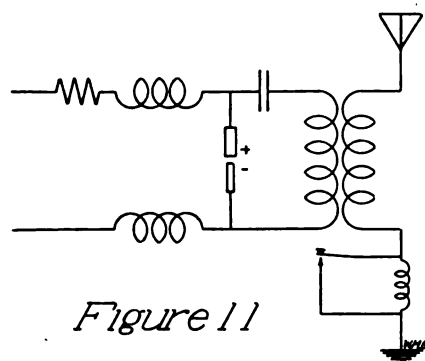
By Jennings B. Dow

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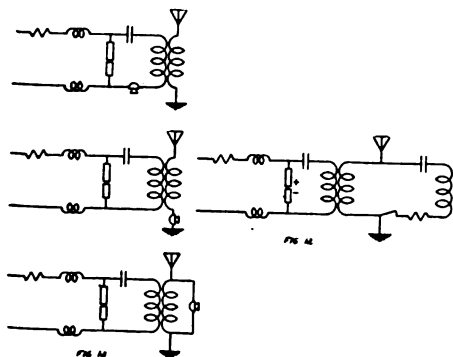
PART V.

CONTROL OF ARC OUTPUT

FOR telegraph work, the problem of controlling the output of the arc presents little difficulty and several methods are available. Fill 11 shows one method in which a key is bridged across a few turns of inductance in the antenna circuit.



This is, without doubt, the most common method. If the antenna current is in excess of four amperes and this should be the case if the arc input is over 1 K. W., the key contacts will be subjected to considerable arcing. This difficulty may be eliminated by decreasing the amount of inductance bridged by the key contacts and, if necessary, by using a multiple key arrangement whereby one set of contacts is called upon to bridge only one or two turns of inductance. It will be seen that by using this method of control, two waves will be radiated. One of these waves cannot be read as the groups of oscillation will conform in duration of time



to the spaces in letters of the code. Fig. 12 shows the absorption method of control. A circuit, consisting of a resistance, inductance and capacity having practically the same constants as that portion of the antenna circuit not

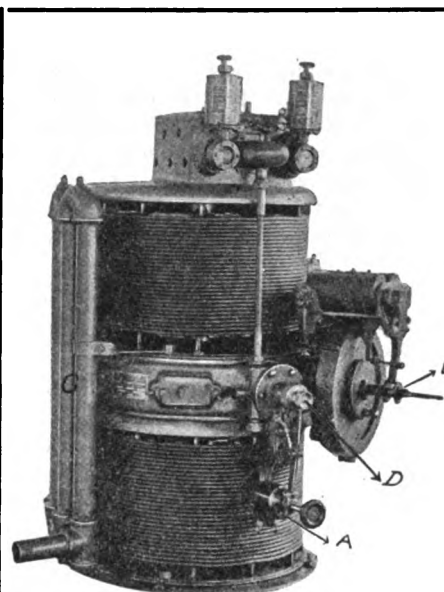


Fig. 2A

Description of Federal Telegraph Co. 5 K. W. Arc Converter, Fig. 2-A.

This converter is used in conjunction with the wave-changer shown in Fig. 4-A, and has many unique features which will be taken up in detail. The cathode is at "D", and the anode, which cannot be seen, is displaced 90 degrees. "A" is a small solenoid which facilitates remote control of the striking mechanism. "B" is a third electrode which is used for signalling in place of the relay keys

heretofore mentioned. Its action is briefly as follows: When no signalling is being done, the electrode is held in contact with the anode by means of a small tension spring. This electrode is connected to earth or what is the same thing, to the cathode, through a resistance of such value that when it is shunted across the arc no oscillations can take place, and signals are made by opening and closing this circuit by means of this key. This is done by energizing the solenoids above the electrode through a local circuit consisting of source of power and a small key. Another novel feature incorporated in this design is the use of a gas seal for the arc chamber "C" is essentially a long piece of pipe, one end of which is connected to the arc chamber and the other end to atmosphere. The total internal volume of this pipe is approximately equal to that of the chamber. When the arc is started, sufficient hydrocarbon is administered into the chamber to fill this pipe with gas as well as the chamber. In case the arc is extinguished for a time, and by virtue of the fall in temperature, the gas contracts, some of that contained in "C" is drawn back into the chamber. Owing to the fact that the chamber pressure is at all times equal to atmospheric pressure, there is little tendency for any air to enter it through leaks.

bridged by this circuit, is placed across the active coupled inductance of the antenna circuit. This circuit is intermittently opened and closed by a key which is preferably placed near the grounded side. When the key is closed, a large portion of the energy which is transferred from the arc is made to flow through the resistance in the dummy circuit where it is absorbed, and this results in a material decrease in the antenna energy.

In certain cases of smaller arcs under 1 K. W. input it will be found possible to control the antenna circuit by opening and closing the antenna circuit. It may be necessary when using this method to loosen the coupling between the open and closed oscillating circuits in order to prevent the effects of excessive reaction between the two circuits and possible extinction of the arc. The application of the arc to radio telephone work has always been a problem, and

up to the present time no really successful method of control has been devised. This lack of a successful modulator for the arc output is largely responsible for the undeveloped low power arc of today.

Microphones whose design vary from the ordinary telephone transmitter as used in wire telephony, to huge water cooled types have been used, and various departures from the ordinary carbon grain type have been made. Majorana used an electrolytic jet which was made to impinge upon two electrodes, and the variation in the physical condition of the jet caused by voice vibration altered the resistance across the path between the two electrodes, and consequently the amount of energy that would be passed. Fessenden varied a capacity shunt across a certain part of the oscillating circuit with some success.

(To be continued)



HELP!

By C. Hennings

I WAS tired. So tired that the last signals I had heard had come through the receivers with a dull and muffled sound, very different from the sharp and clear code I had copied earlier in the evening. I was glad that I could turn in, for now that the nightly press had been received, I had nothing else to do. The mate must have sensed something of my weariness when I whistled through the speaking tube that all was well.

"Pleasant dream, Sparks," he called to me.

I gathered up the sheets upon which I had been copying news, for even a radio station must have some order of neatness, and started to pull off my coat. One arm was out, and I was working with the other when I distinctly heard a call. I stood stock still.

"S. O. S. S. O. S."

I dropped my coat, papers went flying to all parts of the room, and with one jump I was in my chair before the tuner. There was no need, however, of putting the receivers over my ears, for the sounds had come in loud enough the first time to be heard without phones. I quickly adjusted them to my head in a sort of second-nature movement, and reached for a pencil with which to copy what I felt certain would follow. I heard nothing in the phones except a far distant vessel reporting her position. My two detector tubes were droning and hissing away in a regular duet, and I could hear the faint hum of the generator down below in the dynamo room. That was all. I had evidently made a mistake.

Once more I started for my bunk. The receivers were on the table while I began to gather up the press reports which had flown all over the floor. Then as I stooped under the table to get the last sheet, the call came again,

clear, distinct, in a peculiar whistling noise.

"S. O. S. S. O. S."

Once more the papers went to the floor. "Some foreign ship," I thought, for the signals were of a strange fluttering quality. The receivers were again dead. Nothing but the detector hiss came to my ears. Excitedly I tore off the receivers and blew through the speaking tube.

"Just heard an S. O. S. What'll I do?"

"That so," was the mate's rather disinterested reply. "Don't get excited. The ocean is a big place."

"Yes, but this is close. Hadn't we better call the Old Man?"

"Nope, can't bother him with such stuff. Find out where the old tub is that wants help," And with that he hung up his end of the tube.

I was quite angry at the Mate. He was a young fellow, a former naval radio operator, and should have known the seriousness of the distress signal. I jumped to the end of the cabin and peered out of the porthole into the blackness of a murky St. Lawrence night. Before my eyes could become accustomed to the darkness outside, the signal came again.

"S. O. S. S. O. S."

"I just heard it again," I shouted to the Third Officer. "It's a ship in trouble. Pretty close, too. See anything?"

"Nope," was his only reply. I heard the AB at the wheel laugh as I dropped my end of the speaking tube. It jarred on my nerves to have the Mate and the wheelsman joking when a ship was in trouble so near.

Only silence greeted me when I placed the phones over my ears again. Touching the button at my elbow, I waited until the rising whine of the motor-generator told me that the "juice" was ready, and then my own clear spark sung out into the night.

"Who sent out S. O. S.? Where are you? What's the trouble?"

No one answered. At least no ship answered, but in a few seconds Grindstone Island came back in his sharp staccato notes.

"Who heard S. O. S.? Who are you? Where are you?"

As well as I could I told him our position. He then called North Sydney and Point Riche, but neither of them had heard the call. I could not understand it, for the signals had been quite loud. I pinched myself to make certain that I had not been dreaming.

"Your mistake," said Grindstone Island rather caustically, and I was about to reply when a long whistle on the speaking tube stopped me.

"Anything doin', Sparks?" queried the Mate.

"Nothing new," I said.

"Well, listen real hard now," and once more I heard the Quartermaster and the Mate laugh. Then quite distinctly came the call:

"S. O. S. S. O. S."

I drew back to the opposite wall, my heart threatening to upset in surprise. Then from my wall chest I grabbed a can of face powder and again called the pilot house.

"It's very plain now, Mate," I said. "Do you want to hear it?" and when his affirmative reply came down that long winding copper tubing, I filled my end with powder and gave a long lusty blow. Expectantly I waited. I distinctly heard the A. B. wheelsman laugh again, this time with more life than before, and in a second the Mate roared down:

"You win, Sparks, she's sunk!"

RADIO ENGINEER WILL PRESIDE OVER BAY COUNTIES RADIO CLUB

MR. B. F. McNAMEE, research engineer of the Pacific Radio Supplies Company, was elected to the presidential chair of the Bay Counties Radio Club at the regular election of officers held in the club rooms on December 3rd.

Mr. G. V. Tudhope, former president, is now first vice-president; C. H. Grubbs, in charge of the local DeForest factory, is second vice-president, and Stanley Hudd is third vice-president.

R. W. Carroll will remain in office as recording secretary and W. D. Wood will act as financial secretary.

C. T. Peterson was elected treasurer; S. Sollie is the new sergeant-at-arms, and R. H. Cornell, Jr., is the new chief operator.

The board of trustees has for its new members Mr. B. F. McNamee, Mr. G. V. Tudhope and Mr. R. C. Adams.

The speaker of the evening was Mr. M. E. Borch of the Reliance Radio Laboratories. His lecture dealt chiefly with the decrement question of 200-meter transmitters.

Meetings are held on Friday of every week in the new club rooms of the Alden Branch Library, Fifty-second street and Telegraph avenue, Oakland. A radio telephone and spark station will soon be ready for installation. The club has a membership of 140.

THE HAWAIIAN TRANSMITTING TEST

MUCH to the regret of fifteen Pacific Coast amateurs, the Hawaiian transmitting test did not accomplish its object. However, the contestants can feel much encouraged to hear that practically all stations were heard by the operator on the Matson liner "Maui," 1,800 miles from San Francisco, 300 miles from Honolulu. Further encouragement is had in the form of a letter received from a Honolulu amateur who states that he heard a CW station working on a low wavelength at the time that the test was scheduled to take place. The station heard by the Honolulu amateur was probably 6ZE, Mr. D. B. McGown, 1247 Forty-seventh avenue, San Francisco, who was using a CW transmitter on a wavelength somewhat above 200 meters. No stations were heard either by Mr. Mulrony at Pearl Harbor or by Mr. Hall at Honolulu. The following letters will explain more fully the results of the tests. Mr. Mulrony suggests that another test be held in June, 1921, as the present receiving season in Honolulu is an exceptionally poor one. In view of the fact that Mr. McGown's CW set may have been heard by the Honolulu amateur station, we will arrange an individual test for CW equipments and will be pleased to accept applications for another test from amateurs who desire to participate. In the meantime we will arrange further details for our next issue. We publish herewith a letter received from Mr. Kenneth A. Cantin of Honolulu and three letters received from Mr. Mulrony:

Honolulu, T. H.,
November 30, 1920.

Paul R. Fenner,
Editor, Pacific Radio News,
San Francisco, Calif.

Dear Sir:

Kindly send me the transmitting schedule of the amateur stations that entered the trans-Pacific radio test of November 20th and 21st.

On the first night of the test, Saturday, November 20th, I was "listening in" for the coast amateurs, and between 12:10 o'clock and 12:15 I heard a CW undamped wave station working. Not knowing that CW undamped stations were to be used in the test until I received my "Pacific Radio News" a week after the test, giving the list and telling that two CW stations had entered, I tuned out this undamped wave station, as I thought that it would "Q-R-M" the coast amateurs that were transmitting.

I do not wish to claim that I received a coast undamped wave amateur station, but I would like to check over the transmitting schedule of the stations that entered the test so as to see if a CW sta-

tion was transmitting at the time I received these undamped wave signals.

Thanking you for a reply, I remain,
Yours very truly,
Kenneth A. Cantin.

6-T-Q.
Kenneth A. Cantin,
1593 Piikoi Street,
Honolulu, T. H.

U. S. Naval Station, Hawaii.
Pearl Harbor, T. H.
Office of Radio Officer.
November 10, 1920.

Dear Dickow:

Enclosed please find clipping from yesterday's paper. I have a lot of interest worked up here and all stations have agreed to close transmitters. Ten amateurs have already entered today, and the thing bids fair to go well. Give this test some publicity in San Francisco. I would suggest you fellows appoint a committee to take the 10 word official message in a sealed envelope to each of the six stations, the envelopes only to be opened a few minutes before the test—you see this will eliminate any faking, and I am only taking an interest in this because I expect the test to go on the square. Two of the amateurs here have first-class short wave receivers and excellent two-step amplifiers. I understand Mr. Hall has an eight-step amplifier, consequently there is good reason to believe signals will be heard. I will use a three-step amplifier and will only report what I hear in case no one else hears the messages and I do. I am appointing two observers here so that anything we report hearing will be absolutely square.

If we hear anything I will give the papers a good line of dope on you here.
Yours sincerely,
MULRONY.

U. S. Naval Station, Hawaii.
Pearl Harbor, T. H.
Office of Radio Officer.
November 7, 1920.

Mr. H. W. Dickow,
Pacific Radio News,
No. 50 Main Street,
San Francisco, Calif.

Dear Dickow:

Regarding the trans-Pacific amateur test, I have taken up the matter of closing down all transmitters on this island with the Navy through official channels and the request has been granted. The test to take place on November 20th, and 21st, 1920, beginning at 12:01 a. m., Honolulu time and to last twenty minutes each night.

The Radio Corporation and Mutual Telephone Company have also been requested to close down their stations and I expect they will reply favorably this week.

Eleven local amateurs have already entered their request to try to receive the

California amateurs' signals on this test, and I believe there will be at least twenty ready for the start, as we will give this matter considerable newspaper publicity in a few days. There are several very good amateur receiving stations on this island and I have good reasons to believe the test will be successful if all local interference can be made quiet during the test schedules.

I would suggest that you form a committee to select your six best radio transmitters on 200 meters and have these stations send in turn. The first night have No. 1 station start and send a ten-word message, beginning with his call about ten times, then send his message, repeating each word (double) and then finish his schedule with his call letter several times. Each sender to have a seven-minute period, at about ten words per minute, and be sure you have the time of the test correct. With this scheme it will give the local boys here a good chance to copy all that is sent and have the real proof of the test.

I am very much pleased with the interest which is manifested here and trust that everything will go well with the test.

Any messages which are copied as proof of the test will be repeated by Navy Radio Long Waves to San Francisco if the District Communication Superintendent will grant us permission to use this means to inform you.

Yours truly,
M. A. MULRONY.
Pearl Harbor,
November 22, 1920.

Dear Dickow:

Re the test on November 20th-21st, all amateurs were on the job and tried hard, but it appears no one heard anything on 200 meters. I saw Mr. Hall this morning and he says he did not hear anything, so it must be so. I listened in with four-step amplifier and heard nothing except very bad static on 200 meters. Tell the amateurs not to be discouraged, but to try again about next June—the present is about our poorest receiving time from the coast. With kind regards,

M. A. MULRONY.

343 So. Fremont Ave.,
Los Angeles, Calif.,
November 23, 1920.

Editor, Pacific Radio News,
San Francisco, Calif.

Dear Sir:

Thinking it may be of interest to the readers of your magazine, we are giving a few accounts on audibility of stations near San Francisco, as received at our station on the morning of the 21st and 22nd of November, using two stages of amplification (audiotron detector and Western Electric VT-1's) short wave regenerative set of the variometer type and two pairs of "Baldy's."

(Continued on page 185)

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARDWORLD RULE, PLAN FOR
CABLES AND RADIO

Washington, Dec. 8.—(By Universal Service.)—The establishment of a universal electrical communications union, which it is hoped to model ultimately after the International Postal Union, having as its object the international reciprocal exchange of telegraphic, cable and radio communications, will be recommended by the International Communications Congress.

A preliminary report giving an outline of the arrangement it expected to perfect was made public by a special committee including delegates from the United States, Great Britain, France and Japan.

For guidance and control of the proposed union the congress makes provision for an electrical communications council, consisting of representatives of the United States, Great Britain, Japan and France and four representatives to be selected by the other powers.

In countries like the United States, where communication facilities are provided wholly or in part by private corporations, such enterprises when complying with international regulations in the treatment of international traffic, are authorized to exchange such traffic with all government-owned services. — San Francisco "Examiner."

NEW RADIO SITE SELECTED AT
BULL HARBOR, B. C.

VICTORIA, B. C., Friday, Nov. 26.—A site for a new wireless station to replace that on Triangle Island, which is to be dismantled early next year, has been chosen at Bull Harbor, Hope Island, near Shussartie, off the north end of Vancouver Island. The new station will be of similar power to that now at Triangle, and will handle traffic from ships and northern stations. The Ikeda station, which was closed some time ago, has been dismantled.—Seattle "Times."

RADIO ENGINEERS
VIEW PHONE EXCHANGE

THE San Francisco Section of the Institute Radio Engineers met recently in the telephone exchange at 445 Bush street, where the telephone system, together with the vacuum tube apparatus, was explained by A. G. Champereux, transmission engineer of the Pacific Telephone and Telegraph Company.—San Francisco "Examiner."

LONG DISTANCE DAYLIGHT COM-
MUNICATION RECORD BROKEN

H. A. Cookson, radio operator of the S. S. "West Camargo," establishes communication with navy stations at a distance of 1,200 miles from San Francisco.

What is believed to be a record for long distance work during the daylight hours has just been brought to light with the arrival here of the Shipping Board steamer "West Camargo." The operator of the vessel reports that he established communication with the NPW (Eureka, Calif.) navy station at a distance of 1,200 miles west of San Francisco during bright daylight. The following extracts from his log are of interest:

Worked NPW on 600 meter 2 k. w. quenched spark set at 1:30 p. m., a distance of 1,200 miles west of San Francisco. November 24, 1920.

Worked NPM (Honolulu) 900 miles in day time.

Copied NPK (Point Arguello) 600 meter spark in Wellington, New Zealand, at night.

Copied NPM 600 meter spark and KHK 600 meter spark in Melbourne, Australia, at night.

WIRELESS ON TRUCKS

SHANGHAI, Oct. 15.—(By Mail.)—Trucks of the Shanghai Fire Department are soon to be equipped with wireless telephones, conforming to the latest practices of the largest cities. The improvement is expected to enable the department at all times to keep in touch with its men while fighting fires.—Tat-sung "Tribune."

FEDERAL TELEGRAPH NOTES

THE Federal Telegraph Company's application for authority to issue \$500,000 first mortgage 8 per cent serial gold notes was approved by the Railroad Commission on November 24th. The proceeds are to defray the cost of constructing four wireless stations on this coast, one at Palo Alto, one near Portland, Ore., one near San Diego and one near Los Angeles.

Construction of these stations has been made necessary by the termination of an agreement with the Pacific Telephone and Telegraph Company under which the latter company transmitted messages received by the Federal at the wireless plants, but which it could not forward because of lack of facilities.

Completion of the wireless plants at the various points named will enable the Federal company to give full service.—San Francisco "Chronicle."

PRESIDENT-ELECT HARDING
SENDS CONGRATULATIONS
BY RADIO

WHEN President-elect Harding sent his congratulations by radio to the American Society of Mechanical Engineers on their Fortieth Anniversary at Boston the increasing importance of wireless as a means of practical communication was forcibly brought home to all the mechanical engineers of the country.

Senator Harding's message, requesting the co-operation of the membership was broadcasted three times during the evening of November 5th by the station of the American Radio and Research Corporation who received the greetings from Marion, Ohio transmitting them to the Convention at Boston. Amateurs humbly.

Governor Coolidge, vice-president-elect also sent greetings by radio. Other messages received and sent by the Amrad Station were those of Mayor Peters of Boston, Dean Anthony of Tufts College and H. J. Power, General Manager of the American Radio and Research Corporation.

Outside of the novel manner in which the president-elect sent his message to the Convention, its content is of deep significance to the engineering fraternity. Said he, "My greetings and good wishes to the American Society of Mechanical Engineers, on the occasion of the celebration of the fortieth anniversary of the organization. The Administration which comes into power next March fourth very much wishes the advice and co-operation of the membership. Signed: Warren G. Harding."

WESTPORT RADIO TO OPERATE
SOON

Construction work on the new naval radio station at Westport is progressing nicely, and the station is expected to be in full operation in another month, according to Chief Petty Officer James E. Parrott, in command of the new station.

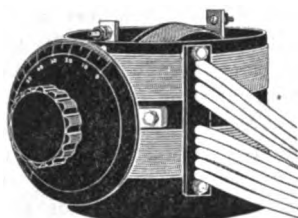
The new radio station will be one of the largest on the Pacific Coast, and is planned to have a sending radius of 1,000 miles, and a receiving capacity of a greater distance. Radio equipment of the latest type is being installed. When in full operation the new station will have a crew of about twelve men.—"Washingtonian."

Your Congressman will stand behind you in your endeavor to crush Bill S4038. If you don't write and tell him to protest its passage he may be in doubt as to how to vote on the bill.

WITH THE MANUFACTURERS

NEW KENNEDY VARIOCOUPLER

THE Colin B. Kennedy Company of San Francisco has brought out a new variocoupler designed primarily for short wave work. This unit is unique in that it affords a wider range of coupling between primary and secondary than is common in apparatus of this type.



The secondary is wound upon a well-seasoned hardwood rotor treated with a special high grade insulating filler to exclude moisture and to preserve and enhance the insulating qualities of the wood. It is mounted centrally within the stationary or primary winding which is wound on a vulcanized fibre tube of very high mechanical and electrical strength. The primary is provided with nine leads constituting a terminal and eight taps.

A small brass casting, through which the shaft passes, is provided to permit rigid panel mounting by the use of only two machine screws. This arrangement affords the obviously desirable feature of supporting the unit and passing the shaft through the panel at points close together.

The general arrangement results in a very simple, rugged and convenient piece of apparatus which is in full keeping with the variometers turned out by the same firm.

THE TRESKO Laboratory has recently added a number of new instruments to its well known line. The latest addition is the Wonder Tuner for 200 meter work. It is of the same size as the style DS tuner, but all tuning is done on a 21 plate variable condenser. When used in conjunction with an audion detector it brings in all the 200 meter stations with surprising audibility. It consists of a conductively wound helix of copper strip and a variable condenser connected in series with the aerial.

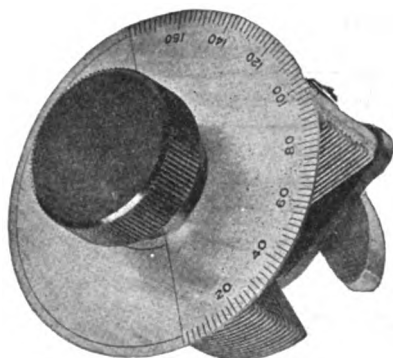
MR. H. MALARIN, formerly radio inspector for the Radio Corporation of America, is now sales manager of the Radio Telephone Shop of San Francisco.

THE SORALA TYPE CSU VARIABLE CONDENSER

ONE of the new variable condensers is the type CSU, made by the Somerville Radio Laboratory. While it is a condenser of comparatively low price, it combines the best features of the best make, and several new ones as well.

Practically everyone is familiar with Chelsea die-cast plate assembly. The CSU is of this type, and moulded Bakelite end-plates of the same manufacture are used to insure extreme ruggedness, best insulation and minimum leakage.

The shaft is of steel, five-sixteenths inch in diameter, running in bronze bearings. At one end a counter-balance is attached which assures permanence of scale position. As a further guarantee against shifting of scale position, a tension adjusting screw is placed on the back end-plate, which, with the broad rear bearing, makes the rotary plate action as stiff as the user desires.



A feature which appeals to many radio men is the ease with which the condenser unit may be mounted on a panel. The black oxidized brass mounting screws and nuts which are supplied also appeal to the more particular radio men, blending harmoniously with the usual grained Bakelite instrument panel.

However, the main feature of this condenser is the dial indicator. Formerly, dials were made of turned Bakelite or moulded composition, with the exception of a few others of white celluloid. While the Bakelite dials present a good appearance and do not warp, they are non-metallic and cannot be used to shield the circuit from capacity effects from the body, and are not adapted to direct calibration, as is possible with the CSU dial. The CSU dial has a COUNTER clock-wise scale which permits a capacity increase by rotation to the RIGHT. The fact that the navy uses this same dial design proves its worth. The dial is SILVER plated and then lacquered to preserve its finish.

Another feature is the generous two-

inch knob, also used on some navy apparatus and on Grebe receivers. Anyone who has tried to tune in CW with a small one-inch knob on the condenser will readily appreciate this "man's size" style.

AS we go to press we learn that Mr. Hall Berringer (6BJ) is now connected with the Radio Shop of San Jose, Calif., in the capacity of sales manager. Mr. Berringer made many new friends at the radio show of the convention, where he was demonstrating the new Radio Shop products.

WE welcome into the field the National Association of Radio Dealers. This new association is yet in its infancy, but is deserving of the support of every radio dealer. The temporary national headquarters are in Omaha, Neb., with Mr. F. Wilson Swain as acting secretary. The purpose of the association is to promote the greatest possible co-operation between the radio dealers, to exchange information and render service beneficial to its members, and aid in the maximum development of the radio industry.

Any person, firm or corporation engaged in the development, manufacture or sale of radio apparatus is eligible to membership.

An official bulletin known as the "N. A. R. D. News" is to be published monthly for distribution among the members of the association.

THE Somerville Radio Laboratories will market a new motor generator for radio purposes. It will be of the single housing, common shaft type with ball bearings. The new Somerville condenser and dial is shown in the accompanying cut. The dial is silver-plated and is six inches in diameter. The condenser unit is of the Chelsea Radio manufacture with a shaft of the correct size to accommodate the new dial and knob.

The Trans-Pacific Radio Operator's Log. A 32-page 5x7 pamphlet, issued on November 1, 1920, for the use of commercial operators employed aboard ships on the Pacific Coast. Contains much valuable information on Japanese radio stations, Oriental radio schedules, data on all naval stations, Japanese weather code signals, Golden Gate compass stations, wave-length abbreviations, and other general information on radio conditions in the Occident and Orient. The authors of the pamphlet are W. Breniman and G. E. Knudsen, pioneer commercial operators of the Pacific Coast.

FRESNO AMATEUR WORKS 150 MILES ON INDOOR AERIAL

Fresno, Calif.,
November 28, 1926.

Mr. Paul R. Fenner,
Editor, Pacific Radio News,
50 Main Street,
San Francisco, Calif.

Dear Friend Fenner:

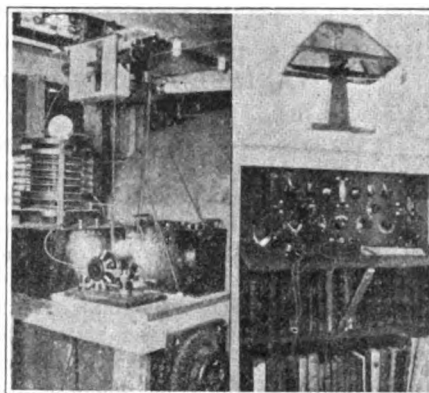
I am enclosing herewith photos and wiring diagram of my new radio installation, with description of same. I consider this installation as a whole something unique, and heretofore untried in its entirety.

You will probably remember that last winter I had my apparatus installed in the Fresno High School, where, operating on a 95-foot fan aerial, my signals were copied 1,600 miles over land, and practically the same distance out to sea. I carried on some relay work, actually exchanging messages with amateur stations up to 1,000 miles distant. This was done on $\frac{3}{4}$ k. w. input, and the transmitting range, I believe, was largely due to the high aerial.

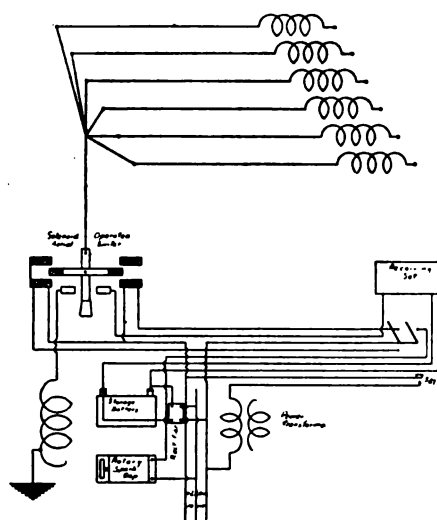
After February my call was no longer heard, as sickness in my family prevented my being away from home late at night. Not wishing to give up the game entirely, I decided to move the apparatus to my home, for the next season's work, so during the summer the set at the school was dismantled.

I then designed and built a modern regenerative receiving set with two steps of amplification, to fit into a built-in bookcase in the living room of our bungalow. It is comprised of the standard fittings and instruments found in most modern sets, the cabinet being 10x20x6 inches, made of mahogany, and nicely finished. The whole set complete with phones, tubes and B-batteries costing just about \$85.

Having no room in the house for the transmitting set, I decided on a remote controlled installation, so put the more or less dangerous and noisy thing in a small cellar under the rear of the house. This set consists of some standard apparatus, and some built by myself. The transformer is a Westinghouse type SK 1 k. w. 220 to 6,600 volts; the spark gap is the larger 12 stud Murdock rotary, which runs about 6,000 R. P. M. It is my intention to inclose the rotor in a cast metal case, similar to the Benwood, as soon as I can get time to make the patterns. The condenser and oscillation transformer were made by myself, being used in the former installation. The condenser is about .01-MF capacity, being built in two sections which are operated in series. Ordinary double strength window glass was used, and covered with tinfoil, the whole be-



ing immersed in transformer oil. A variable reactance is used in the primary circuit, which circuit is carried to the receiving set, and broken with a large Boston key. The set was tuned by means of a wavemeter, and only one turn is used in the primary coil of the oscillation transformer, while seven turns were necessary in the secondary. The input as measured with a wattmeter is 620 watts with a power factor of 0.85, resulting in a radiation of 3 amperes.



Wiring Diagram of Mr. Denny's Station

All operating and control wires run from the cellar to the receiving set through a galvanized iron conduit, including the aerial receiving lead, and this conduit is used as a receiving ground, being connected to the water pipes. The aerial switch, a solenoid operated affair, was also built by myself and is proving entirely satisfactory. The A-battery, an Exide 6 volt, is kept in the cellar also, for lack of other space, and is charged by a standard type of vibrating rectifier which "floats" the battery at a $\frac{1}{2}$ ampere charge continuously.

Having little or no room in the backyard for an aerial mast, due to a maze

of electric light and telephone services, and not wishing to decorate the roof of the bungalow with an unsightly aerial, I decided to put it out of sight in the attic. Realizing that I would not get nearly the required natural wave length in the 40-foot stretch, I wound up inductance coils of a large diameter, each containing 40 feet of wire. The wire used was No. 18 soft drawn bare copper, and six of them were stretched the length of the attic, 3 feet apart, with one of the inductance coils added at the free end of each wire. The aerial was supported from porcelain cleats, and had an average height of 15 feet from the ground. Besides adding to the natural wave length, these coils increased the electrostatic capacity of the aerial system. The lead-in is a length of Packard high tension automobile cable connected to all the wires at one end and passes down between the walls to the aerial switch in the cellar below, the whole installation being entirely concealed and exceedingly well insulated.

My transmitting has been limited to just a few nights, having only recently received my station license, corrected to cover the present installation. I have, however, been heard up to 150 miles, and that distance QSA, so no doubt have a range of several hundred miles. For receiving, the aerial is quite as good as a higher one outdoors. The following stations have been heard in a single week:

6AB, 6AD, 6AF, 6AT, 6AAW, 6ABP, 6BC, 6BJ, 6CY, 6EJ, 6EN, 6ER, 6EZ, 6GF, 6HV, 6IG, 6IL, 6JD, 6JI, 6JM, 6JN, 6KP, 6KX, 6OH, 6OX, 6RJ, 6SK, 6XZ, 6ZA, 6ZH.

I should like to request that from now on all stations hearing 6CS will QSL either by radio or mail, or both, so that the maximum transmitting range of this type of station may be determined.

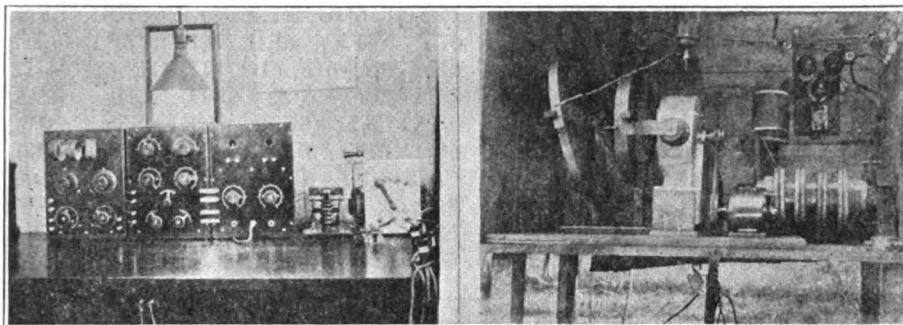
Mr. Fenner, if you care to work up the information in this letter into an article for publication in your "Pacific Radio News" you are certainly welcome to it. I think it would open up opportunities to many members who have heretofore considered operation under such conditions impossible. Some may ask about inductive interference to the parallel lighting circuits in the attic. I shot out several sockets on the start, but after insulating them at their inherent weak points with mica, had no further trouble. Neither am I bothered by induction from these circuits when receiving. Fact is, I get more QRM from my five months' old son than anything else, providing that my two-year-old daughter is in bed.

Signed: R. C. Denny.

"6EN"

HERE is another of our Pacific Coast relay stations. 6EN is its call, and it is operated by Messrs. H. A. Duvall and C. G. Esler. One of the operators is on the job every night. Duval signs HD and Esler signs RX. The station is located in Los Angeles, Calif., and is

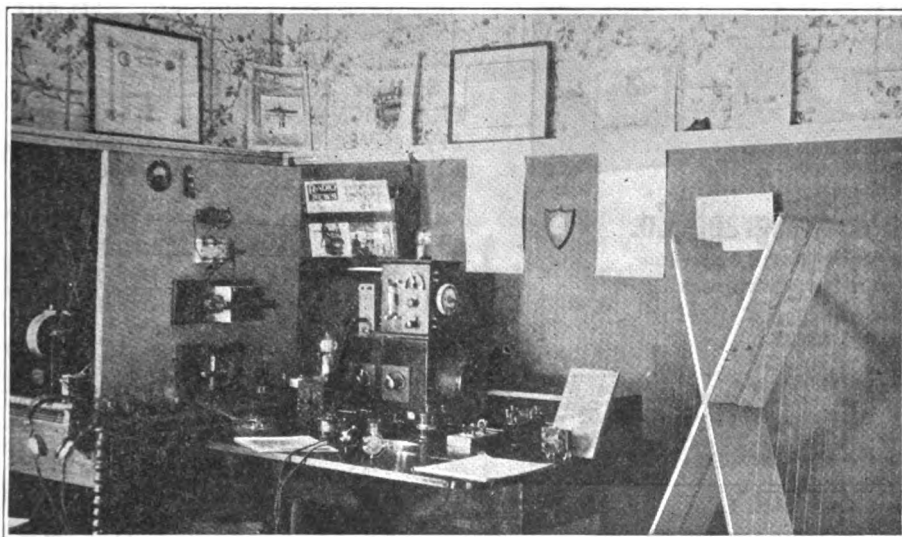
some time. For the ground connection a number of galvanized pipes driven into the earth are used, as well as two large sheets of galvanized iron and a mass of wires running to many water pipes in the vicinity. The receiving set is home-made throughout. A honeycomb coil



well known among the Western amateurs. The transmitter is arranged in a large box and is located in the yard of the station's owner. A home-made 1 k. w. transformer with the secondary wound over the primary on both cores is used for transmitting. The condenser is of the glass plate, oil immersed, type A Benwood gap and a home-made oscillation transformer complete the equipment. The primary of the oscillation transformer consists of one-half turn of $1\frac{1}{4} \times \frac{1}{8}$ inch ribbon, and trouble from heating this of this ribbon is experienced after the set has been worked for

set is used for long wave reception. With the use of one bulb and this set, signals from NSS have been copied with ease. The French station (YN) has also been heard several times. A short wave regenerative receiver and two-step amplifier are used for amateur wavelengths. The receiver is of the tickler coil type and is extremely sensitive. Signals of high amplification are received without distortion of signal note. The familiar "Baldy" phones are used and have been fitted with plugs so that changes to any stage of amplification may be made in the shortest possible time.

ONE DOUBLE YOU TEE



THE photo of station 1WT, located at Manchester, N. H., needs little explanation. The owner is Mr. Louis M. Higgins, 119 Myrtle street.

The receiving equipment consists of a Clapp Eastham tuner, Clapp Eastham

Radian tuner for navy working, and a Tresco long-wave receiver. The A. P. tubes are used for audion reception. Three condensers of variable capacity and two pair of phones complete the receiver.

The EDITOR'S MAIL BAG

Our Readers Are Invited to Send Contributions for Publication in this Department.

THE EDITOR'S MAIL BAG

San Jose, Calif., December 3, 1920.
Pacific Radio Publishing Co.,
50 Main St., San Francisco.

Gentlemen:

6BJ would like to state that he is now using 980 watts for his transformer primary input. The gentleman who calls himself Ten-nin-o in the December issue of "Pacific Radio News" is invited to take a trip to Burlingame any night or Sunday and bring his good watt meter with him to measure the primary input.

The station known as 6BJ has been remodeled during the past month. A rotary gap consisting of a 12-inch disc with 16 studs is driven by a $\frac{1}{4}$ H. P. motor at a speed of 3,400 R. P. M.

Your friend, Hall Berringer.

San Francisco, Calif., December 6, 1920.
Pacific Radio News,
San Francisco, Calif.

Dear Sirs:

Suppose you saw the little item in the "Examiner" about working the S. S. Colombia. I received a letter of commendation from the Navy Department for the good work, working her 4,000 miles out at 11:55 p. m., November 27th. They claim this is a record for the Beach Arc. I am not sure if Inglewood has worked any ship out that far before midnight. On December 1st I worked her out 5,100 miles. Her TR msg said 4,920, 8 p. m., but I did not work her until about 5 a. m., so she must have been about 5,100 by that time. This has been surpassed by the Inglewood station a few years ago. Think a number of records will be made this winter. Worked the S. S. "Meton" on the East Coast last night. Her TR msg. read: "S. S. Meton, New York for Taxpump, Mexico, 90 miles east north east of Taxpump." Not so bad for across the continent. We control the S. F. end of the
(Continued on page 193)

By using the Tresco tuner and a V. T. detector signals can be copied at a distance of more than 75 feet from the phones. A $\frac{1}{2}$ k. w. Thordarson transformer, Amrad quenched gap, Murdock condenser, oscillation transformer and a Roller-Smith hot wire meter are used for transmitting. The set radiates 3.8 amperes on low power. For local work an input of 10 volts is used. A wave-meter containing a Murdock 43 plate variable condenser and DeForest honeycomb coil was constructed by the owner of the station and calibrated by the Bureau of Standards. A radio telephone set is at present under construction, and a Paragon type short wave regenerative receiver is also in the course of home manufacture.

LIST OF STATIONS HEARD BY WESTERN AMATEURS

STATIONS HEARD BY 6CH

6BQ, 6CV, 6EJ, 6ER, 6FH, 6GQ, 6HY, 6IY, 6JM, 6JD, 6KA, 6KP, 6KI, 6LI, 6OH, 6OP, 6OL, 6SK, 6UM, 6VN, 6ZA, 6ZN, 7BK, 7CU, 7CD, 7DE, 7DI, 7GQ and 7ZI.

These stations were heard on an aerial fifteen feet high, suspended in a grove of trees.

STATIONS HEARD AT 6ZB

5ZA, (6AE), 6AH, (6AK), 6AN, (6AAZ), 6BJ, 6BV, 6BQ, 6BR, 6CO, 6CP, 6CV, 6 DP, (6EA), 6EC, (6EJ), (6EN), (6ER), (6EV), 6FB, 6FA, (6GE), (6GI), 6GR, (6HH), (6HU), 6HY, (6IF), (6IZ), (6JD), (6JI), 6JM, 6JT, (6KA), (6KC), (6KP), (6PI), (6ZM), CNM, 6MO, (6NP), 6NY, 6OH, (6OJ),

6OT, (6OV), (6RP), (6SK), 6QJ, (6XZ), 6ZG, (6ZH), 6ZK, 6ZL, 7AD, 7CC, 7CU, 7CW, (6VL), (6VJ), (6WN), (6WK), 6AFY, 6AFU, 6ADX, (6ADA), 6ABP, (6ADO), (6AEH).

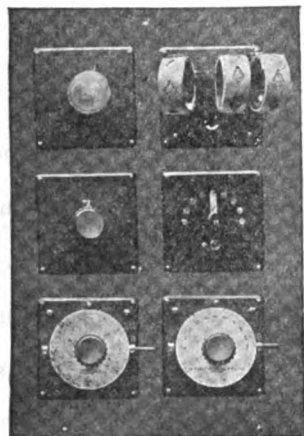
COPIED AT 6OC, SAN FRANCISCO, TO DATE

6AJ, (6AK), 6AV, 6BQ, 6CT, (6CV), (6DP), 6DH, 6EA, 6EB, (6EJ), 6EN, 6ER, (6FE), 6FH, (6FS), 6FT, 6GE, 6HY, 6IC, 6IF, 6IH, 6II, 6IL, 6IT, 6IU, (6IY-CW), 6JE, (6JD), 6JI, (6JM), 6KA, 6KE, (6KP), 6MZ, 6NY, (6OH), 6OT, 6PQ, (6PR), 6QM, 6QR, (6SK), 6TC, 6TF, 6UM, 6XZ, 6ZA, 6AAK, 6AAT, 6ABG, 6ABP, 6ACU, 6AFY, 7BJ, (7BP), 7CC, 7CF, (7CU), 7CW, (7DA), (7IN), 7JW, (7ZI), 7BQ.



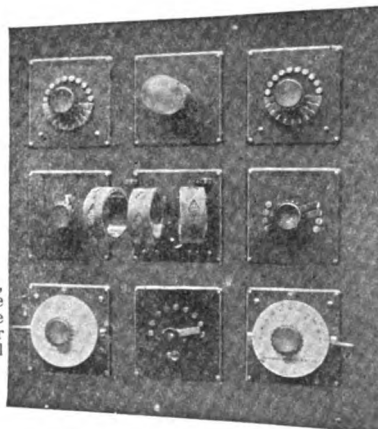
Newest Ideas in DeForest Unit-System Receiving Apparatus

ADVANTAGES of the Unit-System include extreme economy due to the simplicity and interchangeability of the Units; convenience in arranging circuits of the individual need; and greater operating efficiency due to the engineering design and quality of the instruments. The Unit Sets shown here are examples.



SIX PANEL UNIT SET

comprising a combined Tuner and Detector to receive all local stations and practically any large station in the world. Everything necessary for the operation of the set, including detector tube, "B" battery, head phones and a set of 11 coils, can be had for \$75.00 complete. (Purchaser to furnish panel board and "A" battery). This set will give greater satisfaction than any outfit at anywhere near this price. Expansion possibilities unlimited.



NINE PANEL UNIT SET

comprising the same six panels shown above, and either three additional panels to give one step of amplification, or three panels to increase the efficiency of the original six. The former will add about \$23.70 to the cost of the original six; the latter about \$12.10.

DeForest Radio Telephone & Telegraph Co.

Manufacturers and Inventors of High Grade Radio Apparatus
1415 SEDGWICK AVENUE NEW YORK, N. Y.

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451 THIRD STREET, SAN FRANCISCO



RADIO CLUB DIRECTORY

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts., San Francisco, Calif. Meetings every Tuesday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

Mr. Neilssen, radio operator on the WOG (S. S. Fred Baxter), reports copying Station 6EA with good audibility on October 30, 1920, between 10:45 and 11:30 p. m. 6EA was calling 7ZI, also working 6JR and 6ZK. The WOG was anchored in Evans Bay at Reid Island, Canada, 154 miles north of Vancouver, B. C., or approximately 1,500 miles from Los Angeles, Calif.

Station 6EB: 6AEW, 6AFY, (6AK), (6AR), 6GE, (6GF), (6GO), (6OC), 6OT, 6PJ, 6XZ, (6ZA), 6ZH and 7CC.

NAMV (U. S. S. Madrono) heard 6EB while off Cape Mendocino, Calif., at 5:15 p. m. (sun still shining).

WOG (S. S. Fred Baxter) copies 6EB while off the coast of British Columbia. Signals were reported loud and clear.

Stations heard by E. H. Harris, Santa Cruz, Calif.: 5ZA, 5ZK, 7ZK, 6JT, 6IG, 6NY and 6ZA. Stations worked: 7GY, 6NY and 6ZA.

Stations heard by 6DK: 6FS, 6IU, 6EA, (6CV), 6EJ, 6AK, 6ABP, 6FJ, 6IY, (CW), 6VO, 6AH, 6KP, 6SK, 6BJ, (6JM), 6PQ, 6KA, 6PR, 6DP, 6GF, 6JR, 6JN, 6EN, 6ZB, 6AAV, 6FD, 6AAW, 6AFV, (CW), 6EP, 6JD, 6CP, 6AAB, 6AAT, 6XZ, 6AFY, 6ER, 6AFU, 6HY, 6NY, 6AE, 6IL, 6IG, 6OY, 7ZI and 7CU. Those hearing 6DK will please QSL.

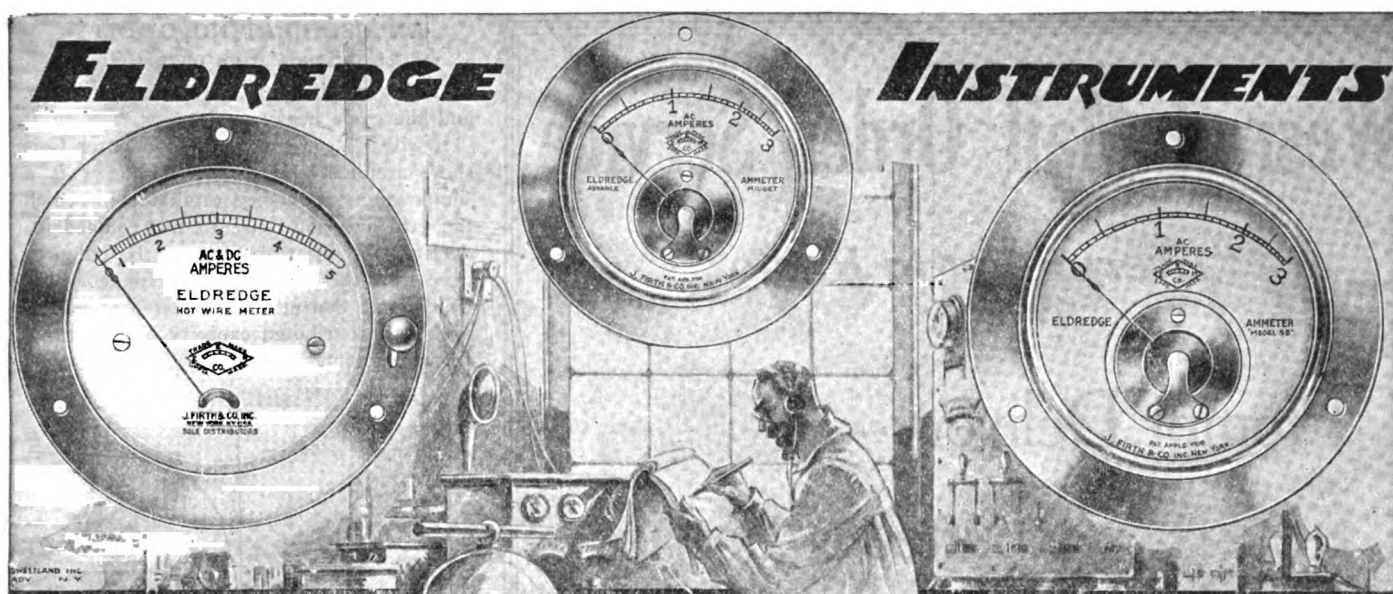
Call list correction: 6CU—Charles F. Filstead, 2010 Sixth avenue, Los Angeles, Calif.

CALLS HEARD BY 6EA (Additional)

Heard: 6ADE, 6AJ, 6GF, 6GN, 6OC, 6PR, 6UO, 6ZH, 7BP and 7DA.

Worked: 6AH, 6AR, 6CP, 6CV, 6DH, 6IC, 6JT, 6NE, 6XX, 6ZA, 6ZK, 7BQ and 7CC.

SAVE THE AMATEUR. Tell your Congressman to vote NO on Bill S4038.



Absolute Dependable Accuracy—Low Priced

The Wireless amateur has always asked for a set of good looking, neat and compact electrical measuring instruments that were unfailingly accurate and reasonably priced.

ELDREDGE Instruments fill all of these requirements. They are designed and manufactured by a firm world renowned for creating the most accurate type of miniature electrical measuring instruments.

Notes on all types: Scales calibrated individually to ensure absolute accuracy—polished nickle finish—flush mounting.

RADIO FREQUENCY AMMETERS AND MILLI-AMMETERS. Overall diameter 2 1/4". Ranges 0-600 milli-amps, 0-1, 3 and 5 amps. Price, \$7.00.

ADVANCE "MIDGET" AMMETERS AND VOLTMETERS. Ideal for small panel mounting. Embodies the improved French movement. Supplied in 12 ranges for D. C. and A. C. Price \$8. Overall diameter 2 1/4".

MODEL S-D, A. C. AMMETERS AND VOLTMETERS. Designed especially for 60 cycle transformer primary circuits. Overall diameter 2 1/4". Voltmeters, \$10.00; Ammeters, \$9.50.

Ask your dealer for literature on these instruments. If he cannot supply you, write us direct, giving his name and address.

JOHN FIRTH & CO., Inc., 18 Broadway, New York



Number 766

SEVEN SIXTY-SIX

Contains fifteen cells connected in series; solidly packed and sealed in paraffine; topped with half an inch of sealing wax rendering the unit absolutely waterproof and not effected by climatic changes.

One positive and one negative lead, both of insulated cord six inches long.

Dimensions over all: 6 1/2 in. x 4 in. x 3 in. deep. Voltage 22 1/2 V.

This battery is particularly adapted to the use of the beginner and will give long and faithful service.

EVEREADY

Wireless "B" Batteries

SEVEN SEVENTY-FOUR

Made up of twenty-seven cells connected in series. The wooden case containing this battery is cooked in melted paraffine with a half-inch of sealing wax added after the cells are in place, making of the whole a unit impervious to moisture.

One negative and six positive terminals. All terminals have heavy brass screws and nuts. This battery allows a range of 18 to 43 volts in steps of 4 1/2 volts.

Dimensions over all 9 in. x 3 7/8 in. x 3 3/8 in. deep.

Suitable to a wide range of requirements, this type of wireless battery, will meet the needs of those who demand the best.

Number 774



The National Carbon Co., Inc.

San Francisco

Los Angeles

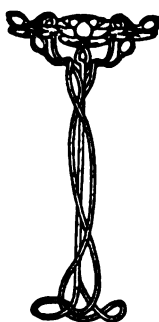
599 Eighth St., San Francisco

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"Everything in Radio"

Prompt Delivery---
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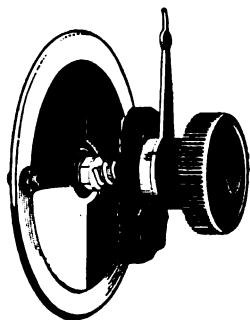


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Stock Bulletin and Price List

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550 SOUTH FLOWER ST.

LOS ANGELES, CALIF.



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16

Dealers: Write for discounts

PARKIN MFG. CO.,

San Rafael, Calif.

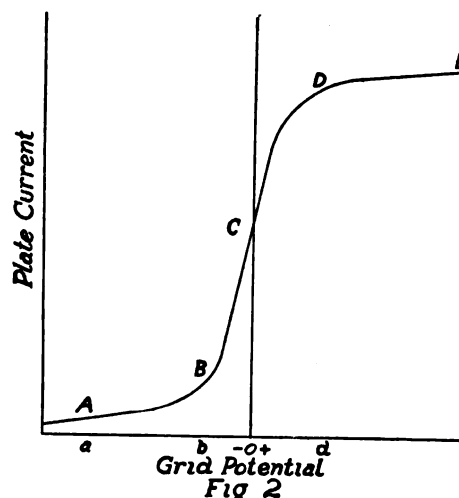
When writing to Advertisers please mention this Magazine

AN OSCILLATING ODDITY

(Continued from page 169)

rapidly as it had made the sudden jump, and the cycle began again.

It will be seen that if the condenser C is short-circuited, the circuit of Fig. 1 is a simple audio-frequency oscillator in which the grid and plate circuits are coupled inductively by the transformer. It will produce a continuous note, the frequency of which will depend chiefly on the inductance and distributed capacity of the transformer windings.



The curve in Fig. 2 is known as the characteristic curve of the valve, and is typical of the type of valve used. It is obtained by connecting batteries of various voltages between the grid and the negative end of the filament, and reading the corresponding currents in the plate circuit. When the valve is oscillating, the plate current rises and falls between the values B and D, or, in other words, from nearly zero to saturation. This, of course, means that the grid potential oscillates between the values b and d, due to the inductive coupling between the plate and grid circuits. The grid, being a cold electrode, attracts electrons from the filament when it is positive with respect to any part of the filament. When the grid is negative, it cannot, in a "hard" valve, give back electrons to the filament or space charge, except they return through the secondary of the transformer. While the valve is oscillating, the grid attracts electrons each time its potential is positive, as at d, and these electrons usually return to the filament through the secondary of the transformer, constituting what is called the grid current.

When condenser C is used the valve will start oscillating, but now no electrons can flow from the grid, and therefore the grid soon accumulates a negative charge. As soon as this negative charge reaches some value a on the lower flat portion of the characteristic curve the oscillations stop and the plate current is reduced to zero or very near it by the negative grid charge. If the insulation of the grid lead and the condenser was perfect the negative charge

(Continued on page 184)

YOU'RE LUCKY—

—you amateurs who live on the Pacific Coast
or in any state west of the Mississippi River—

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make necessary the use of a variable voltage. And what method of variation is more convenient, efficient and economical than that employed in the "VARIABLE STANDARD VT BATTERY?"

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Type No. 7623



(Pat. Applied For) Type No. 7650

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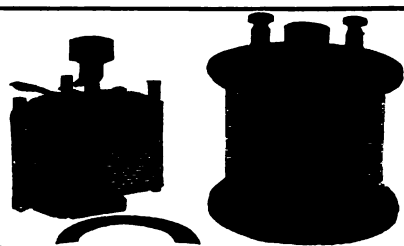
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The Condenser with "Star Spring" Tension

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Hard Rolled Aluminum Plates

These condensers are made by a watch mechanic, schooled in accurate workmanship and who can't get over the habit of critical inspection.

Three Styles: No. 1, Panel; No. 2 Open Type as shown; No. 3, Fully Encased. Anti-Profitteer. Less than pre-war prices. Fully assembled and tested.

	Style No. 1	No. 2	No. 3
67 Plates\$7.00	\$	\$
43 " 3.50	4.50	4.75
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13 " 2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured P.P.

With Style No. 1, we will, if desired, furnish 3 inch Dial with large knob, instead of Scale and Pointer. Extra Price 75 cents.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

The "ILLINOIS" is rapidly adding to the number of its friends. The bouquets they fling only spur us to still more careful work, and more rigid inspection. It is a matter of pride that among the thousands of instruments sent out, not a single complaint has been received of bad condition. This may possibly be because every instrument is subjected to the scrutiny of the "old man's" eyeglass.

Patent is pending on the "Star Spring" feature, which is very valuable. The action of this spring produces an unvarying friction that holds the "rotor" in any position to which it may be set, and at the same time automatically centers the plates in relation to each other, and prevents and possibility of "endshake." The plates are in proper relation by construction, and will remain so, obviating any necessity of readjustment. Once right, always right. Once mounted on your panel, there is one thing that you can depend upon to never give you trouble.

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Kindly note: We issue no Catalog, and make no "trade discounts." We set our prices at the lowest limit, and leave the "middle man" out for the sole benefit of the "consumer."

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THE RADIO AMATEUR
Marion, Ill.

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Room 303

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Read about what's going on among the Commercial, Navy and Army operators

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Write us for information about our new set of unit panels. Also Detectors, Amplifiers, Complete Receiving Outfits, etc.

SPECIAL THIS MONTH—{ Knob and Lever, 10 points, with nut & Piece Tested Galena, 75c p. p.

HI-GRADE WIRELESS INSTR. CO. ASHEVILLE, N. C.

A Combination that Can't be Beaten

For Results—real long-distance signals on short wave lengths you can't beat the



This is the Outfit which made a reputation for itself in the recent QSS tests.



Relay Receiver (Type CR-3)
and
Detector and 2-Stage Amplifier
(Type RORD)

You can get into the Big Relay Game and become one of the dependable long-distance men with this outfit.

Inspect this Outfit at your Dealer's. If he doesn't carry our line as yet, drop us a postal for catalogue, mentioning his name.

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When you say "PITTS"CO" you think
of Everything in Radio.

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DL 500	2.40
DL 600	2.65
DL 750	2.80
DL 1000	3.00
DL 1250	3.35
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Acme 1½ Henry 500 MA Cap single	\$6.00
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wave special. A complete receiving set 210.00
Note: All Grebe sets with the exception of the CR-7 make ideal receiving sets for wireless telephone work.

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Radiotron UV-200 Detector tube....	\$5.00
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Note: These are the latest tubes put out by the Radio Corporation.	

TRANS. CONDENSERS—(Dubbler)			
Type	Watts	Volts	Cap. Price
D-100	250	10,000	.007 \$19.00
D-101	500	14,000	.007 30.00
D-102	1000	21,000	.007 45.00
D-103	1000	25,000	.007 50.00
D-113	1000	25,000	.01 55.00

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F. D. PITTS CO., Inc. Dept. E 12 Park Square, BOSTON, MASS., U. S. A.

RUB YOUR EYES AGAIN!

TALK ABOUT SALE—HERE'S A GOOD ONE

—And the reason? Well it's this. The C and S Catalog is ready. We need your address to send you a catalog. So we figured that by offering these remarkably low prices, you will grasp the opportunity and order some apparatus. Thus, we will secure your address and send you a catalog. So, in this ad we are offering superlative apparatus selling at EXTREMELY LOW PRICES.

THIS EXTRAORDINARY LIBERAL OFFER POSITIVELY
EXPIRES IN 30 DAYS

The Old Reliable Short Wave Amplifying Receiver

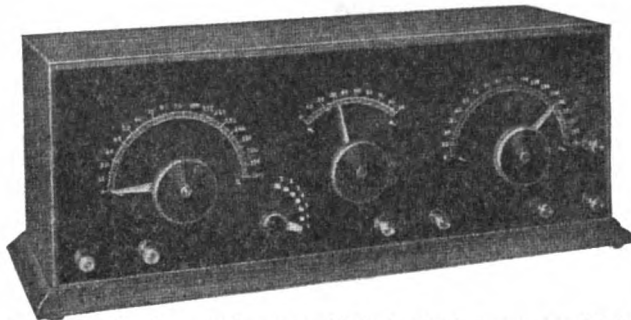
SPECIAL
PRICE

ONLY

\$35

Express Two dollars extra.

Only one receiver sold to a customer



The super-sensitive, super-selective, and super-efficient short wave amplifying receiver of wide renown. We guarantee this receiver to be the best of its kind sold today. Get one today and receive those signals at marvelous intensity. Amplification 100 times. Complete receiver ready to connect up as a amplifying receiver only \$35.



GENUINE RADIOTRONS

Those ultra super-sensitive detector and amplifier bulbs. Absolutely the best bulbs sold. Detector operates on 22½ plate voltage; amplifier 45 volts. For maximum results and efficiency you should use "radiotrons." Order today—while the price is low!

Detector UV 200
Special price only
\$4.50
Postage 1 lb.

Amplifier UV 201
Special price only
\$6.00
Postage 1 lb.

NOT MORE THAN SIX OF EITHER TUBES
SOLD TO ONE CUSTOMER



C and S NAVY TYPE DIALS Regular \$1.00 4-in. white celluloid dial 75c. Regular 75c 3-in. white celluloid dial 50c.
BAKELITE PANELS 6 in. x 6 in. x 1/8 in. only 89c. Postage 1 lb.
12 in. x 6 in. x 1/8 in. only \$1.77. Postage 1 1/2 lbs.

SAVE MONEY—BUY TODAY—AT ONCE
OUR STOCK LIMITED. ORDERS FILLED IN ROTATION
THE C and S RADIO-ELECTRIC CO., Dept PI-21, OMAHA, NEBRASKA

AN OSCILLATING ODDITY

(Continued from page 180)

would remain constant and no further action could occur. But what we commonly term a good insulator is really a conductor of some millions of ohms resistance. Consequently the negative electrons will flow very slowly from the grid through the glass, the base, etc., or, in other words, the grid slowly loses its negative charge. As the grid potential is changed by this "leaking" process from *a* to *b*, the plate current rises very slowly. This part of the cycle occupies the greatest length of time. As soon as the negative electrons on the grid have sufficiently "leaked off" to bring the potential to *b*, the valve will again oscillate, since the steep portion of the curve has been reached. The sudden rise in plate current takes place just as soon as the oscillations start, since the direct current component of the plate current while the valve is oscillating is much larger than its valve at *B*. The grid again accumulates a negative charge as before, and the cycle is repeated.

The length of time required for a complete cycle is usually several seconds. It depends chiefly on the following:

- Insulation of the grid and grid lead;*
- Insulation of the condenser;*
- Capacity of the condenser;*
- Filament current;*
- Plate battery voltage.*

The degree of insulation of the grid and condenser partly determines the rate at which the negative charge can leak off.

The larger the condenser the greater will be the number of electrons accumulated by the grid before its potential is sufficiently lowered to stop the oscillations, and consequently the longer it takes the grid to lose its charge. A one mf. condenser, substituted for the one-tenth mg. used at the Wireless Show, would lengthen the cycle to about 30 seconds.

The filament current and plate battery voltage partly determines the position and shape of the characteristic curve. Because of this, and other reasons, both of these quantities have something to do with the frequency of this circuit.

Anyone interested in vacuum valves will derive much knowledge of their operation, and a good deal of amusement, by connecting up this circuit and experimenting with it. Most experimenters are not equipped with a very sensitive meter, but this may be omitted, and the action studied with the telephone receiver. If the circuit does not operate at first, reverse the leads on either the secondary or primary of the transformer. The writer welcomes communications from those who try this experiment.

Stratton Electric Company

Wireless Material, Parts, Small Instruments of All Makes, Educational Books. Send for List No. 5.

215 Federal St., Greenfield, Mass.

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ALL THAT ITS NAME IMPLIES
THE MAGAZINE OF EXPERIMENTAL AND PRACTICALLY
APPLIED SCIENCE

Monthly articles on the design, construction and operation of radio telephony and telegraphy apparatus, chemistry, construction of apparatus, analysis, etc.; physics, popular science, physical phenomena, etc. Literature sent on request. 15c a copy at most newsstands. \$1.50 yearly.
EXPERIMENTAL SCIENCE CO. 710 14th Street, Washington, D. C.

When writing to Advertisers please mention this Magazine

HAWAIIAN TRANSMITTER TEST

(Continued from page 173)

When we received letters from "DX" radio men stating that they copied our signals as far as 50 and 60 feet from the phones, it was hardly believable until we proved it the other night by reading the following amateurs as far as 60 feet from phones. In fact, they could be heard much further. To be sure about it, one of us stayed in the station while the other walked out in the back yard and would tell by voice in code whether the station was saying NPM or signing his own call. They are:

6AK60 feet
 6EJ60 feet
 6BJ60 feet
 6ZK60 feet
 6ZE50 feet
 6BN50 feet
 6KL50 feet
 6OC10 feet

Now, in regard to the weather here on the morning of the 21st, before 2 a. m., there was a low and heavy fog and slightly "buzzy." After 2 a. m. the sky was clear, stars and moon observable, the best weather one could expect for a long distance test. About 3 a. m. the steady buzz and heavy fog came back to pay us another visit. But, thank heaven, it stayed out while the test was being carried on. It certainly came off in fine shape the 21st, but not so good the 22nd. It was pretty cloudy, and that steady buzz which we all loathe was in again. That is the next thing we will all have to fight, since we have "Old Man Static" pretty well wiped out. It seems to be in a different locality every night and is pretty hard to tell whether the power companies are to blame or "Old Man Static's" assistant. We would like to hear through "P. R. N." whether or not the amateurs from other distant points get this steady buzz business. Amateurs in Pasadena, ten miles north of us, claim they can hear it 100 feet from the phones at times.

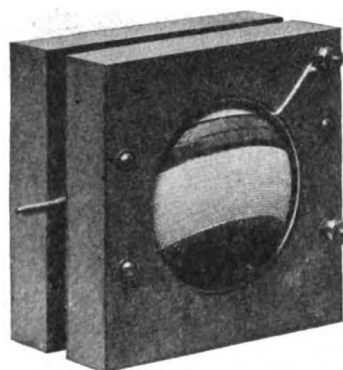
We hope that the Honolulu test will show some remarkable records for the Pacific Coast amateurs.

We are very sorry that we will be unable to attend the convention, but will certainly experience pleasure reading all about it in the "Pacific Radio News."

Very truly yours,

Seefred Bros.,
 6EA and 6 EB.

THE radio inspector at San Francisco has received a number of letters recently complaining of the working of other amateur stations. A large number of these letters have been unsigned, and it is the desire of the radio inspector to inform the writers that such letters cannot be considered unless the name and address of the writer is given.



VARIOMETER



VARIO-COUPLER

RADIO SHOP VARIOMETERS

Of original design embodying features not to be found in any others. Winding forms of seasoned stock especially selected for its non-shrinking and insulating qualities. Natural finish and treated for resistance to the elements. No dark stains, which invariably contain conducting properties, are used. Windings held in place by a special compound combining high mechanical strength with low distributive capacity—a very important item. Bearings of heavy brass bar, giving ample contact surface. This contact is strengthened by a phosphor bronze spring. Can not possibly groove the shaft. This bearing is an exclusive RADIO SHOP development. The clearance between stationary and rotating windings is correctly proportioned to give a wide and accurate range of adjustment with a minimum of distributive capacity. Shafts are of brass, one-quarter inch in diameter, milled to take a standard three-sixteenth inch dial.

Variometers, each - - - \$10.00

RADIO SHOP VARIO-COUPLERS

Of the approved rotating secondary type. Cylindrical primary winding, sectional tapped for six values of inductance. Secondary of ball type supported by aluminum castings of ample proportions and embodying the RADIO SHOP spring bearing as used in our variometers. Secondary does not rotate within the primary, but above it. This is on account of the loose coupling necessary for 200 meter work. Mounted on square wood base.

Vario-Couplers, each - - - \$8.00

STANDARD DIALS: To fit units. Three inches in diameter. Genuine Bakelite filled with brilliant white.

Dial, complete with Knob - - - \$1.30

All communications should be addressed direct to THE RADIO SHOP as the California Electric Supply Co., are NO LONGER EXCLUSIVE distributors of RADIO SHOP products.

Write for descriptive matter just off the press.

The Radio Shop

San Jose, Cal.

New Catalog of

Radio Apparatus

Our apparatus must please you—
all your money returned if it does not.

RADIO APPARATUS

Mailed Postpaid on Request
Quality Apparatus
Low Prices

Navy Type Key
Marble Base
Silver Contacts
\$5.85

Ask for Catalog No. 94P83.
Sears, Roebuck and Co. Chicago

Acme Amplifier \$13.00



Acme Detector \$10.00

THE ACME AMPLIFIER shown in the cut sells for a price only slightly greater than the retail price of the individual parts, which include an ACME type A-2 Amplifying Transformer, Tube Socket, Filament Rheostat, Dial, Oak Box, Engraved Bakelite Panel and Binding Posts.

The ACME DETECTOR is mounted in the same way and includes a Condenser and Grid Leak in place of the Amplifying Transformer.

Compact

Attractive

Short Connections

By connecting adjacent binding posts of two Amplifier units side by side a two-stage amplifier is obtained with separate filament control and same A and B batteries. A detector may be added to either one or two-stages with the same ease of connection.

Acme Apparatus Company 21 WINDSOR STREET,
CAMBRIDGE 39, MASS.

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Special folder of designs
and prices in addition to
regular catalogue free
on request.



Be sure to see these new
numbers, which will
put new life in
your club

METAL ARTS CO. Dept. 9 **Rochester, N. Y.**

ANYTHING IN—

Telephone Garfield 71

RADIO APPARATUS

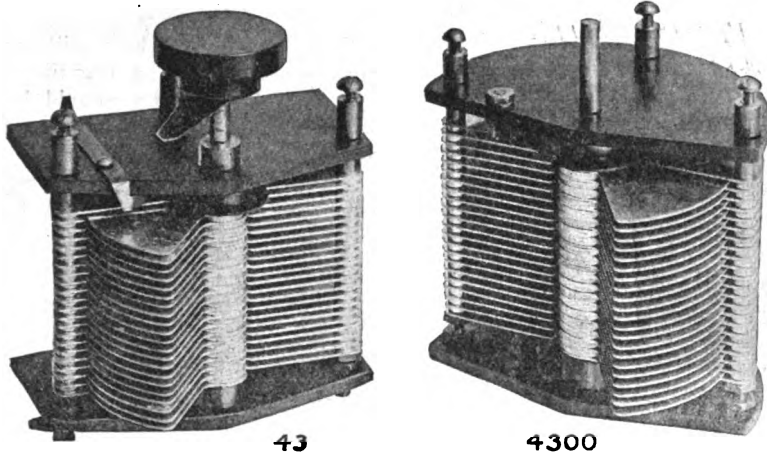
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Frank P. Herrguth Al Rosenberg
Formerly of Paul Seiler Electric Works

520 Market Street

San Francisco, Cal.

When writing to Advertisers please mention this Magazine



Announcing a New Variable Condenser

Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

REMEMBER—WE ABSOLUTELY GUARANTEE SATISFACTION OR YOUR MONEY BACK.

SERIES "T"				—PRICES—		SERIES "L"			
No. 20	2	plate	VERNIER	.....	\$2.00	No. 2300	23 plate, .00075	.....	\$ 6.00
No. 70	7	"	.0001 m.f.	.....	2.35	No. 4300	43 plate, .0013	.....	8.00
No. 130	13	"	.0002 m.f.	.....	2.75	No. 6300	63 plate, .002	.....	10.00
No. 170	17	"	.0003 m.f.	.....	3.15				
No. 230	23	"	.0005 m.f.	.....	3.60				
No. 310	31	"	.0007 m.f.	.....	4.30				
No. 430	43	"	.001 m.f.	.....	5.25				
No. 630	63	"	.0015 m.f.	.....	7.50				
Include postage for one pound						Include postage for two pounds			
Either style of condenser fitted with indicating dial at additional cost of 75c.									

Include postage for one pound

Either style of condenser fitted with indicating dial at additional cost of 75c.

Include postage for two pounds

The Wireless Shop

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Federal Transformers	7.50
Mica Grid Condensers.....	.50
Genuine Navy Rheostats.....	2.75
45-volt "B" Batteries.....	5.00
Audion Panels	11.00
Audion Panels (professional).....	15.00
1-stage Amplifier	22.50
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We reached Portland (150 miles) with our type "O" Radiophone using AC. Why not install one?

Northwest Radio Service Co.

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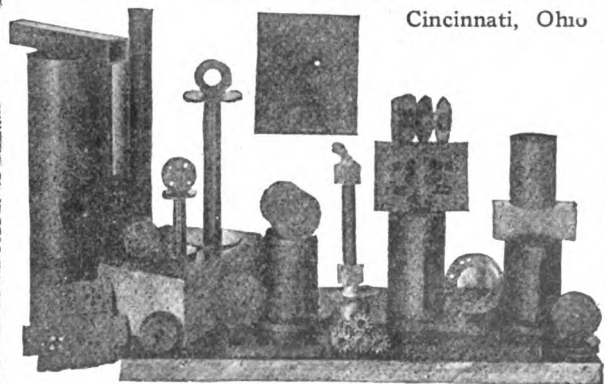
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Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

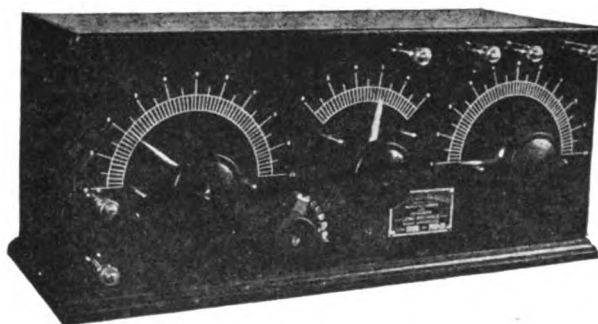
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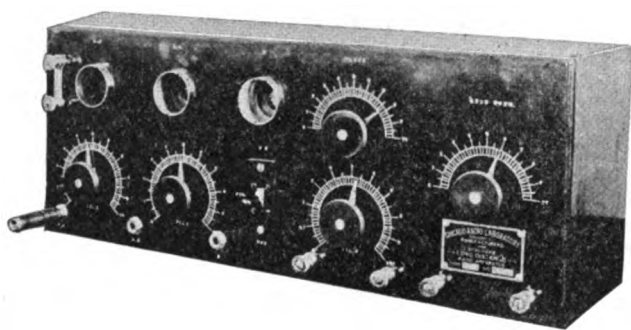
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It won't perch on the tree, but--- IT MAKES A "BIRD" OF AN XMAS GIFT



C. R. L. Paragon Reg. Receiver

The C. R. L. Paragon, with its tremendous amplification factor and extreme electrical efficiency combined with mechanical perfection and convenience, makes the ideal Christmas present—and you can be sure that it will be appreciated—BUT be sure that you get the genuine C. R. L. product. Look for our name on the instrument. The genuine C. R. L. Paragon is used in almost all long distance stations throughout the country. Price, F. O. B. Chicago, \$65.00.



C. R. L. Amplifigon, Type AGN-2

IF A "BIRD" OF A GIFT ISN'T ENOUGH FOR HIM, ADD AN AMPLIFIGON AND MAKE IT A "WHALE"!

The C. R. L. Amplifigon detector and two step amplifier is now equipped with phone plug and jacks for detector and each step, our special 3-way battery switch with transmitting position, extra phone posts, NON-SQUEALING transformers and many other special features. Combined with the C. R. L. Paragon, it makes up the BEST complete short wave receiver on the market today, bar NONE. Price, F. O. B. Chicago, \$105.00.

Both sets fully guaranteed for TWO YEARS.

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Special preparations made for Xmas deliveries. Write for our descriptive bulletin.

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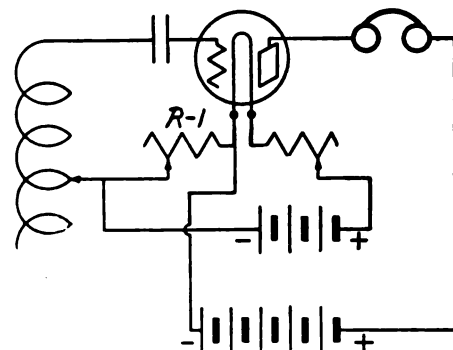
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Cor. King and Yonge Sts., Toronto, Ontario, Canada

OBTAINING A NEGATIVE GRID CHARGE

THE hook-up shown here will enable the user to obtain a negative grid charge. The rheostat R-1 should be of the low ohmage type in order to permit of very close potential adjustment.



Courtesy of the Amido Apparatus Company

BOOK REVIEW

Radio Engineering Principles. By Henri Lauer and Harry L. Brown. First edition, second impression. Published by McGraw-Hill Book Company. Contains data and information on radio communication in general and covers the new and extensive developments in the art made during the war. Devoted largely to the characteristics and use of the three element vacuum tube in radio telegraphy and telephony. Mathematics resorted to only to indicate the application in the problems of design of apparatus. 300 pages. Cloth bound. Price \$3.50. Western distributors: Technical Book Shop, Rialto Building, San Francisco.

OPERATORS' GENERAL INSTRUCTIONS AND LAND LINE TARIFF BOOK

For use of commercial ship and shore operators. Published by the Ship Owners' Radio Service, Inc. Contains full account of rates, abstracting of messages of any character, message forms, time signal and weather information, watch hours for operators, instructions on counting of words, general traffic regulations for Shipping Board vessels, and other data of value to the commercial operator. Can be secured from any Ship Owners' Radio Service Station at \$1.50 per copy.

SAN FRANCISCO RADIO CLUB WILL START MEM- BERSHIP DRIVE

WITH the view of having every radio man in San Francisco on the Membership list of the San Francisco Radio Club, a new membership campaign will soon be in progress. It is planned to reduce the initiation fee to \$1 for a period of thirty days. The dues will remain at 50 cents per month.

Storage Batteries

are but one of several

hundred radio accessories supplied by us. Order anything of standard make advertised elsewhere and get immediate delivery in a single package, that's SERVICE. Send stamp for details of SAVING you can make.



C-1 4 volt 20-40 amp hour.....\$ 7.25
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C-3 6 volt 20-40 amp hour..... 10.75

Type "C" designed especially for lighting vacuum tube filaments. Supply limited.

T-1 4 volt 20-40 amp hour.....\$10.75
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T-4 6 volt 40-60 amp hour..... 20.00

Type "T" designed for automobile trade are excellent for tube lighting.

F-1 6 volt 60 ampere hour.....\$19.00
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Add 5 per cent excise tax to these prices which are FOB Marko factory Brooklyn, N. Y.

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The valves Telefunken.
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dozens of stations. We



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OUR NEW
CATALOG
JUST OUT, BRIM-
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Send 10c Stamps



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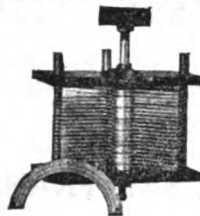
THE MOST WONDERFUL TUNER IN THE WORLD FOR
\$10.00—ADD PARCEL POST

"On the evening of July 10th I was listening in with a companion a Marconi Operator using your 20,000 meter tuner when we heard NSS with great clearness and copied the whole of the message. We also heard NSF in communication with a U. S. War ship. We also heard NFU which we have been unable to identify. All these stations we heard quite distinctly and had no trouble in taking down the messages. The Aerial used was 70 feet twin wire on a house in the city. The circuit the one given by you—altogether we were listening in five hours. The tuner was never silent for a moment and we received messages from dozens of stations. We considered these results excellent."
(Signed) W. R. Wade, 6 West Mall, Clifton, Bristol, England.

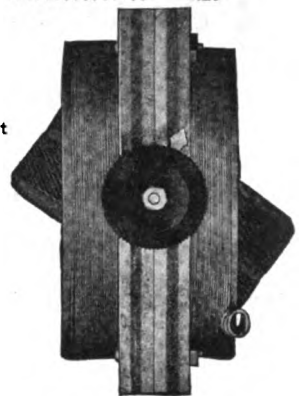
PERFECTION BINDING POSTS—6 FOR 75c
KNOCKED DOWN OR ASSEMBLED CONDENSERS

Which kind do you want? Made for panel mounting and are complete with scale, pointer and knob. Used all over the world. No C. O. D. orders, add Parcel Post. Buy from your local dealer or send us his name if he can't supply you. Formica tops and bases. Movable plates are now held by nuts and not clamped with washer as formerly.

11 Plate K.D.	\$1.80
21 Plate K.D.	2.25
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VARIMETER
VERY
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\$5.00 Add P. P.
Boxed in Cabinet
With Scale
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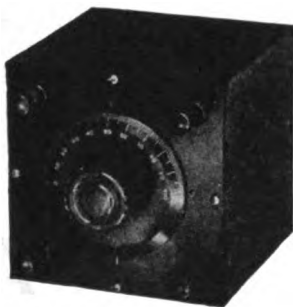


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7 Plates, 15,000 volts
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Midwest Agency for New Radiotrons

\$5.00 Each, add Parcel Post

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Type 7

TO IMPROVE THE SHORT WAVE REGENERATIVE CIRCUIT

Realizing the need of a neat, compact and highly efficient variometer for the modern receiving set, we have produced one which we feel will meet the requirements.

Type 7 is assembled ready for panel mounting and can be easily mounted by simply drilling a 1/4-inch hole in the panel.

Type 12 is a complete unit and consists of Type 7 mounted on a 4 1/2 x 4 1/2 bakelite panel incased in a mahogany finished cabinet. Four binding posts are provided so that leads can be connected to any side.

Both types are furnished with a standard 3-inch dial and knob and make a very attractive instrument.

PRICES (Charges Prepaid)

Type 7G (for grid circuits)	\$ 7.50
Type 7P (for plate circuits)	7.50
Type 12G (for grid circuits)	12.50
Type 12P (for plate circuits)	12.50

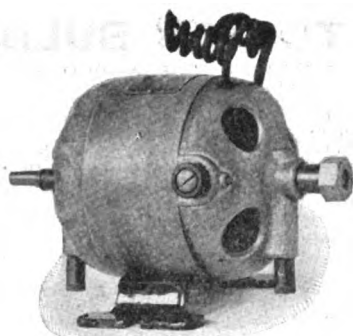
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Type C-2-110 Volts Specify A. C. or D. C.
These motors equipped with special
thrust bearing. Eliminating vibration
Price, Postpaid in U. S. **\$13.85**

Eight spark point rotor for this motor made of
1/4-in. grade XX Bakelite Dilecto \$5.75 postpaid.

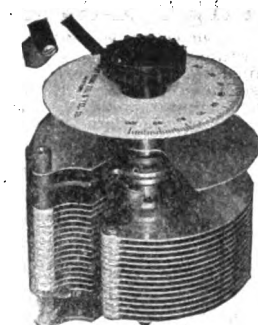
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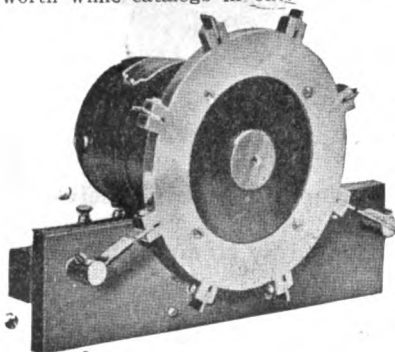
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DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.) \$27.50
Renewable Rotary Electrodes (not less than five sold), each05
Renewable Stationary Electrodes, each10
Type A Motor as supplied with above gap (shipping weight 6 lbs.) 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

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Another Bulletin on Late Developments in
RADIOPHONE AND CW ACCESSORIES
The Nucleus is fully described, as are
the component parts which may be
purchased separately

Type J 0-100, 0-300, and 0-500 Milli-
ammeters, 3-inch flush type..... \$ 7.00
Type J 0-3 and 0-5 D.C. Ammeters. 7.00
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Resistance), 3-inch flush type... 16.00
\$10 General Radio No. 127A H. W.
Ammeters, 0-1, 0-2½, 0-5 ranges 7.75
Special Radio Microphone with Adj.
Bracket 4.50
Type CSU .0006 mfd. Balanced Var.
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ON SORALA SPECIALTIES!
It pays to send East for "Sorala Service"

Somerville Radio Laboratory

102 Heath St. Somerville, 45, Mass.

Dependable
Efficient
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**A
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EQUIPMENT

ACE Regenerative Receiver \$90.00
ACE Regenerative Tuner 65.00
ACE Audion Control Cabinet..... 22.50
ACE One-step Amplifier (Cab. type) 27.50
ACE Two-step Amplifier (Cab. type) 60.00
ACE V.T. Socket with Grid Leak.. 1.50
ACE 3½" Etched Metal Dial..... 1.50
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ACE Stopping Condenser..... 1.00
ACE Grid Condenser75

We also carry in stock a complete line
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gaps, transmitting transformers and
condensers, oscillation transformers, keys,
kickback preventers, formica panels and
tubes (any size), switches, binding posts,
contacts, etc., etc.

Your mail orders will receive our
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THE PRECISION EQUIPMENT CO.

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Audion Control Panels

Panel size 4x6½ in. of Polished Forkica, use V. T. or Auditron Tube, Rheostat, Grid condensor, B battery control, 6 binding post, mounted on brackets, all metal parts highly nickel plated and polished,, 30 day special price \$6.25 prepaid.

One Step Amplifier

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Two Step Amplifier

Panel size 6½x8 in. 30 day special price \$22.50 prepaid

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Drawer 307

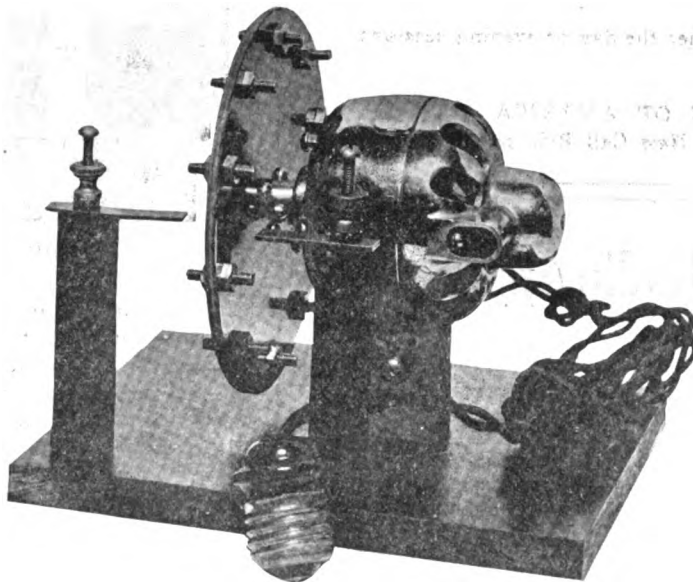
GREENVILLE, PENN.

LET THIS BE YOUR NEW YEAR'S RESOLUTION—

Resolved—That I will Use a Good Rotary Gap Throughout the Year of 1921 and Will Cease to Jam the Air With that Inefficient, Mushy Spark.

A GOOD ROTARY GAP IS A RADIATION BOOSTER

The illustration shows our commercial type Rotary Gap with 110 Volt Motor. Will operate on either A. C. or D. C. Ten Stud Motor, constructed of best grade Bakelite Hard Rubber Stationary Electrode Supports. Cord and Plug Attachment Supplied with each Gap.



\$12.00

Include Postage on eleven pounds

THIS GAP WILL HANDLE ONE KILOWATT SAFELY. ROTARY AND STATIONARY ELECTRODES ARE EASILY RENEWED.

Our New Bakelite Audion Control Panel with V.T. Socket, Rheostat, "B" Battery Switch, Nicked Binding Posts and Brackets for Table Mounting, \$8.00.

RADIO DEVELOPMENT COMPANY

Manufacturers of High-Grade Radio Apparatus

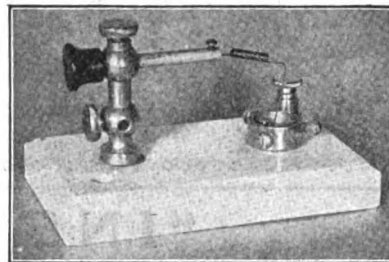
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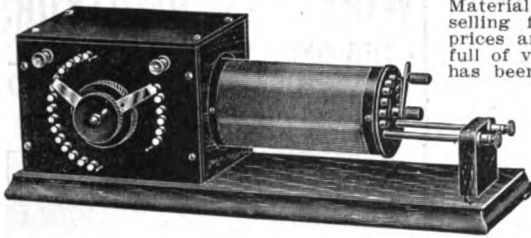
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THEO. AUDEL & CO., 72 Fifth Ave., N. Y. Please submit for examination Hawkins' Electrical Guides (Price \$1 each). Ship at once, prepaid, the 10 numbers. If satisfactory, I agree to send you \$1 within seven days and to further mail you \$1 each month until paid.

Signature _____
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Arnold Navy Type Loose Coupler

Send 3c stamps for Bulletin No. 3

PRICE, \$20.00

This Instrument is made of the best Material obtainable and is equal to others selling for \$25.00 and higher, all fancy prices and frills are eliminated, is chock full of value and is made by a man who has been before the public for the past 8 years making Wireless apparatus.

It will tune up to 3,500 meters. I also stock the finest line of switch points, Hard Rubber knobs, Cabinets and accessories on the market. Prompt delivery of all orders has distinguished me.

J. F. ARNOLD

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Knobs, Handles

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INSULATION SPECIALTIES

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Best Substitute for Hard Rubber or "HI-HEET"
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OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

335 New Call Bld., San Francisco

WE RECOMMEND "Saco Radio Apparatus"

Price.....\$50.00

without distorting the incoming signal.

The Audion Control Panel illustrated is the very best of its kind. It has a variable grid condenser to control the grid potential, a filament ammeter, telephone condenser, plug type grid leak, etc.

The Two Stage Amplifier illustrated at the right is guaranteed against squealing and howling as found with other makes of amplifying units. They can be used with equal success in amplifying radio telegraph and telephone signals

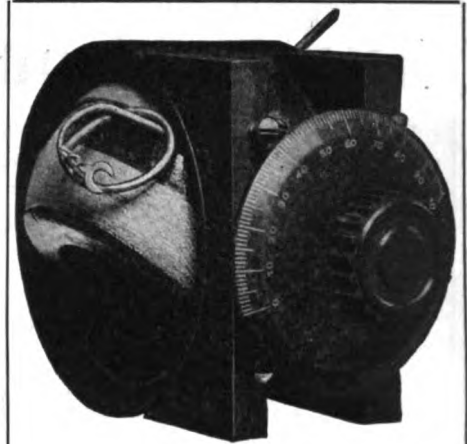


Price.....\$50.00

Order anything in RADIO PARTS or made up—
We have it.

American Electro Technical Appliance Company

Dept. PR. 235 Fulton Street New York

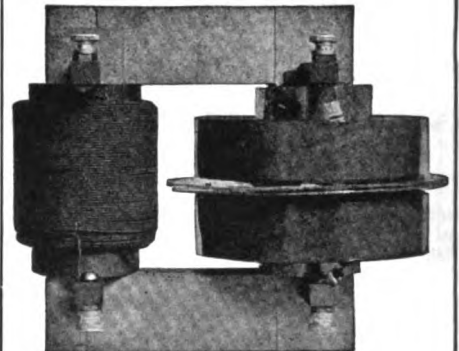


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

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Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps.

THE EDITOR'S MAIL BAG

(Continued from page 177)

air mail service radio stations. It is getting to be quite a circuit. They are using 2 k. w. arcs on the western division and some 5 k. w. sparks in the East. They average time for a message to get back East on this circuit is about 45 minutes. They are installing radio telephones on the airplanes now. Radio seems to be taking quite a forward march. Your "Pacific Radio News" is very interesting.

Yours truly,
DANTE H. CORDANO,
U. S. Naval Radio Station,
Goat Island, Calif.

Remember, If S4038 is made a law it will seriously harm the amateur. Protest the passage of this dangerous bill today—don't wait until tomorrow.

Station 6ZE,
1247 Forty-seventh Avenue,
San Francisco, Calif.,
December 8, 1920.

Pacific Radio News,
50 Main Street,
San Francisco, Calif.

Gentlemen:

In connection with the Honolulu transmitting test on November 21st last, concerning which your representative requested me to state the exact time I transmitted and thus started the test, together with the matter sent, I will state that at 2:32 a. m., San Francisco time (12:02 p. m., Honolulu time), I started, and called NPM for one and a half minutes on my 60 cycle non-synchronous spark on 200 meters and then shut down. I called NPM again on both buzzer modulated, and pure continuous wave for the remainder of the three-minute period and then broke off and told 6BJ to go ahead. The undamped wave set was radiating exactly one and a half amperes on 230 meters, using 4 vacuum tubes, with about 400 volts on the plate. Being able to receive at the same time the transmitter was operating. I left the CW set run for a few minutes longer in order to have it ready for communication again in case I should need to start the next station, knowing that it would not interfere with the test owing to its extreme sharpness, and because of its being considerably over the normal amateur wave of 200 meters. I shut the transmitter down at about 2:39 or 2:40 a. m.

Trusting this information will be satisfactory, I remain,

Yours very truly,
D. B. McGOWN.

P. H. Boucheron, formerly associate editor of the "Radio News," is now connected with the Radio Corporation of America as assistant to Mr. Elmer E. Bucher in their sales department.

Makes Audions function properly

Ever have trouble making your audion set behave? Perhaps the vacuum tube oscillates too freely. Perhaps the regeneration is faulty. But, whatever it is, the **Pen Brand Grid Condenser** will cure that trouble. The grid condenser is the most important part of an audion set. The grid of an audion is its control element. And the **Pen Brand Grid Condenser** makes the audion grid function properly.



THE PEN BRAND GRID CONDENSER—

Firm, strong, rigid and substantial. 3-in. long, 5/8-in. wide, 3/4-in. deep, properly insulated, and carefully made of best grade materials—formica, heavy copper foil and India mica. This construction will not absorb moisture. Every one guaranteed to work and serve satisfactorily or money refunded. No matter what audion set you are now using, Pen Brand Grid Condensers will increase the efficiency of that set. If your dealer does not have Pen Brand, order direct from us.

\$1 POSTPAID ANYWHERE IN AMERICA

Dealers and distributors—our trade proposition will interest you. Write for it.

OTHER PEN BRAND PRODUCTS—

Note the low prices. Nothing is omitted from the construction of Pen Brand Products that will make them work better and wear longer, but no money is wasted adding unnecessary decorations or creating false appearances. Thus you get good, serviceable, guaranteed apparatus at very small cost. If your dealer cannot supply you with these Pen Products, write us direct. Order by number.

TRTS-31—Audion Control Panel—price \$12.50. Panel 5x9 inches, ready for cabinet mounting, and complete with latest improvements including eleven switch contacts, 'arc' and 'spark' switch and points. Complete description on request.

TRTS-33—Amplifier Control Panel—price \$18.00. Panel 3x9 inches. Made to operate in conjunction with TRTS-32 audion control panel. Same size and when placed side by side makes a very attractive combination.

TRTS-32—Audion Control Panel—price \$12.50. Panel 3x9 inches. Particularly adapted for use where compact and efficient control panel is wanted for limited space. Equipped with Pen Brand Grid Condenser. Latest construction features.

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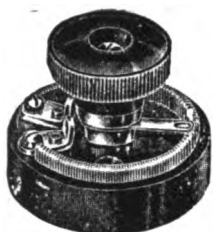
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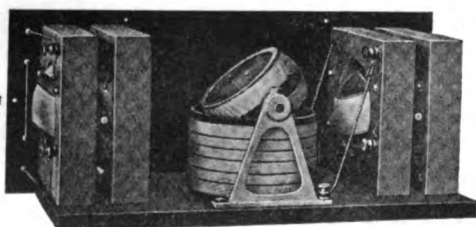
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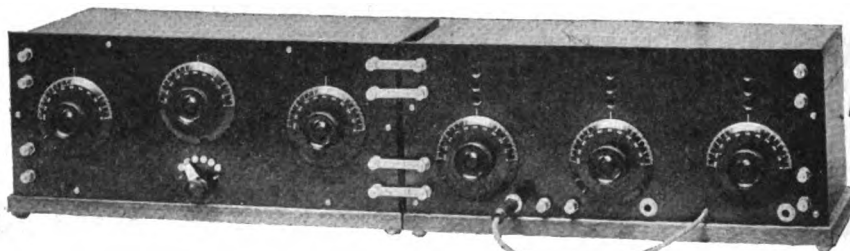
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Inside view of RADIO SHOP short-wave Regenerative Receiver, showing variometers and vario-coupler. Licensed under Armstrong U. S. Patent No. 1,113,149.



Cut showing the RADIO SHOP short wave Regenerative Receiver combined with the RADIO SHOP Detector and two-step Amplifier. The California Electric Supply Co. is a distributor for this apparatus manufactured by the San Jose (Cal.) Radio Shop.

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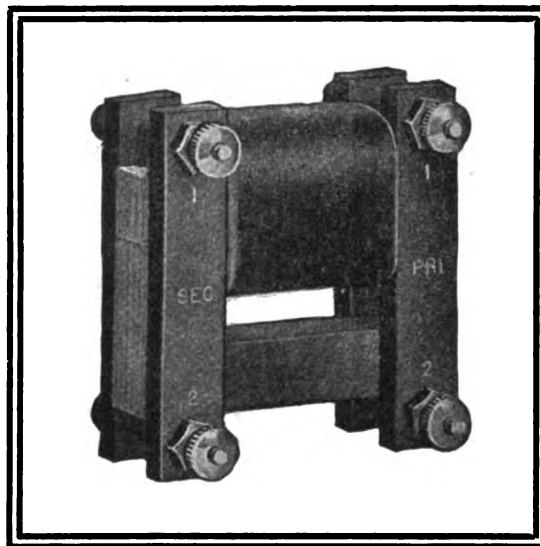
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No. A4 PRICE FIVE DOLLARS

Shipping Weight 2 Pounds

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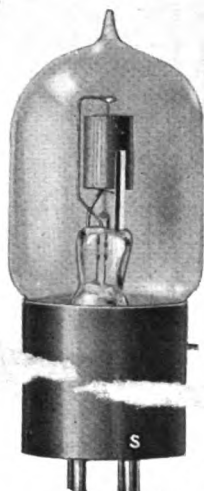
*Pioneer Journal of
Western Radio News and Development.*

why the navy did it—

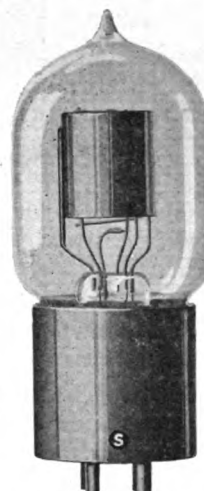
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For sure results, for better results use **A-P tubes** and only **A-P tubes**—equipped with the SHAW standard, four-prong bakelite base (patented).



The A-P VT
Amplifier-Oscillator
Price \$7



The A-P
Electron Relay
Price \$6

Only a combination of tubes provides all necessary operating characteristics without compromising essential features. A combination of two or more **A-P VT tubes** as amplifiers with an **A-P Electron Relay** as the initial detector or oscillator is the ideal receiving combination for long distance amateur or long wave reception. This is the one vacuum tube combination in actual use.

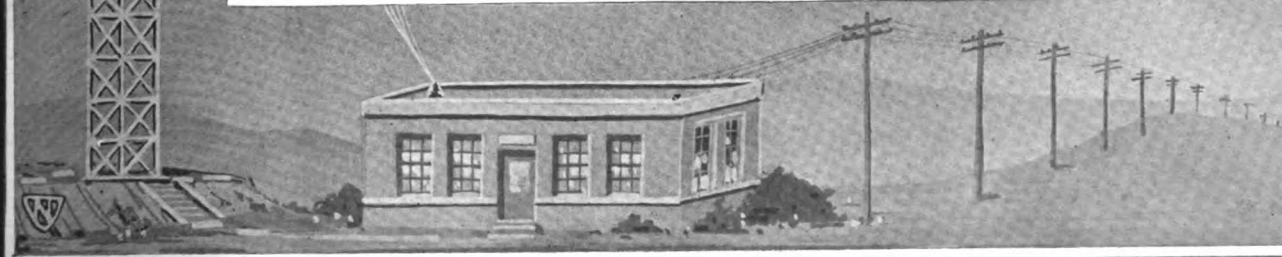
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Write for special Bulletin C 301.

Type C 300 is a free and persistent oscillator for regenerative amplifications and CW reception.

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Type C-300
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The price of **THE RADIO SHOP** Long Wave Receiver, complete with Audion Control in same cabinet, is **Seventy-five Dollars**.

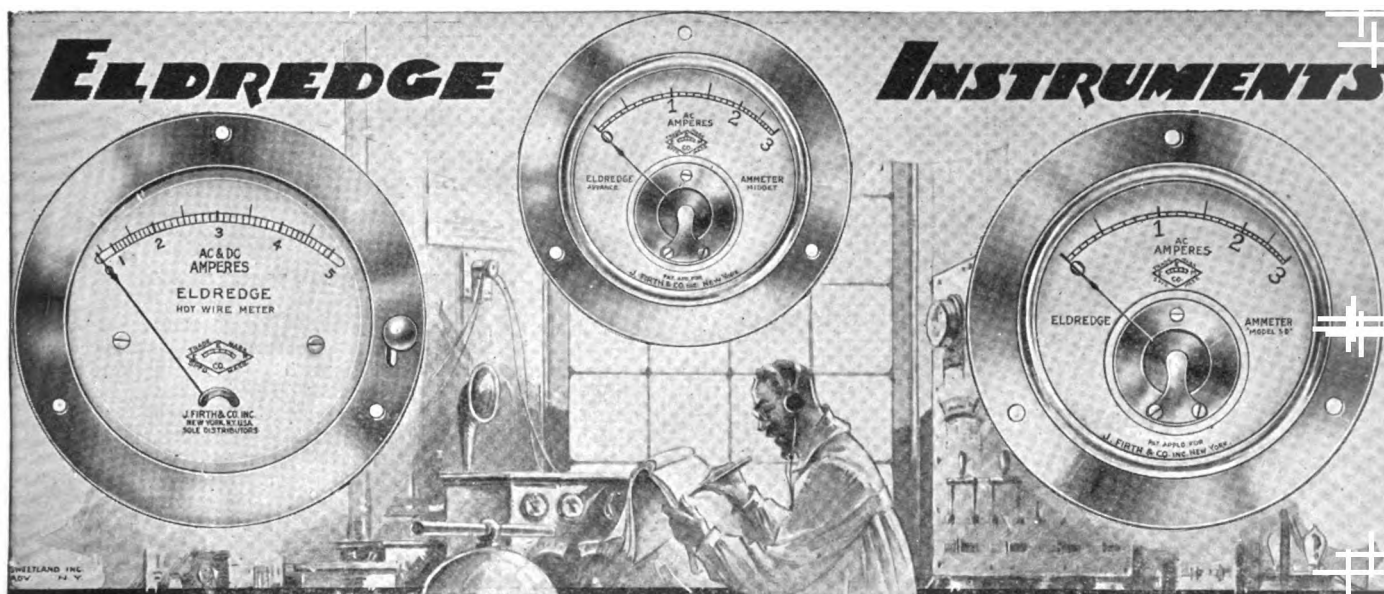
Descriptive matter on this receiver will be off the press shortly. Write for your copy now.

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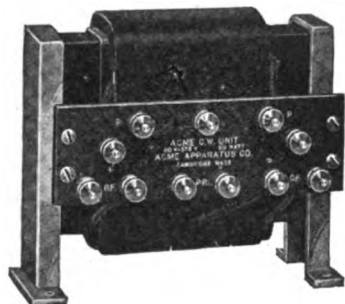
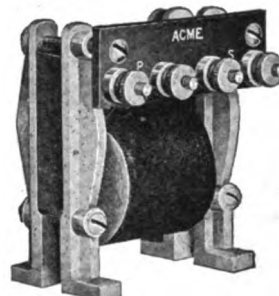
Ask your dealer for literature on these instruments. If he cannot supply you, write us direct, giving his name and address.

JOHN FIRTH & CO., Inc., 18 Broadway, New York

ACME APPARATUS

Amplifying Transformer

The Heart of the Amplifier



CW Power Transformer

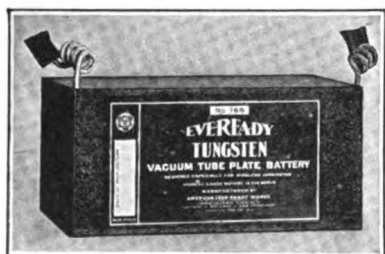
May be used with rectifying tubes or for high voltage A. C. on Power tubes.
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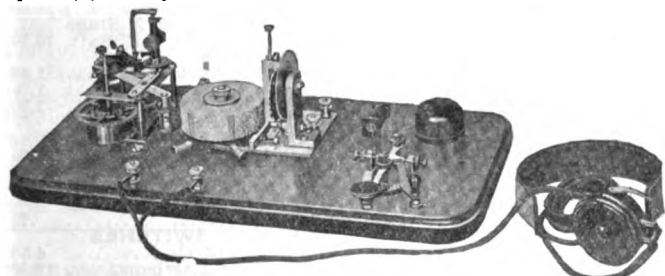
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Two previous models of Adams-Morgans Co. the PARAGON R. A. 6 and the PARAGON R. A. 200 Universal Range receiver, are of course genuine. However these models are now discontinued and the PARAGON R. A. TEN is the only genuine PARAGON on the market.

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Partial List of our Mail Order Specialties follows. Order direct from this ad, and then send for complete catalogue.

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THE PACIFIC COAST ADVISORY COUNCIL

THE Pacific Coast Radio Convention went on record as favoring the formation of a Pacific Coast Advisory Council for the purpose of arbitrating, adjusting, and acting on such proposals as may be presented to it from time to time. With the close of the convention the work of the Council should not come to a close. To date nothing has been accomplished. Why? Simply because the Council has not received the support of the Western radio men. Nothing has been submitted to date and nothing has been heard in regard to the activities of the newly-formed body of the Pacific

Coast's leaders in the radio profession. You can hardly expect anything from the Council unless you submit something for adjustment, arbitration, or otherwise.

If you have something up your sleeve, now is the time to let it out.

If you want a square deal on the Pacific Coast the Council will see that you get it. The first meeting of the Council is scheduled to take place during the latter part of February and you may rest assured that if the Council comes to order without a single issue presented to it for adjustment it may never meet again.

Therefore, those of you who want ACTION on any question, whatsoever, must take the first step—the Council will do the rest.

What better combination of radio men at your service can you ask for than Major J. F. Dillon, Captain C. I. Hopough, the District Radio Superintendent of the navy, the Pacific Coast representative of the U. R. T. A. the Radio Supervisor of the U. S. Shipping Board and Mr. A. E. Bessey of the A. R. R. L.?

Show these men that you want the help of the Council by asking them for help. None of them are mind-readers.

MONEY—EFFICIENCY—SUCCESS

THOSE three words look good to about 99.9 per cent of the radio people. Everybody wants money, wants efficiency everywhere, and ultimately everyone wants to succeed.

And is efficiency always desirable? In a radio set, yes, but it is not always right elsewhere. Efficiency often treads on the wrong persons; it asserts that might is right, and we have heard and seen enough of that principle in the recent war. Efficiency doesn't work with human beings—its place is with the material things like our radio apparatus. Today, in the land of radio, amongst the factories, the cry for MONEY has brought about a distinct influence on the development of radio apparatus and radio principles. The outgrowth and advancement of any science is always by the process of evolution. Regenerative circuits of today were not hap-

pened upon, nor did they grow; but they were evolved from a simple beginning to the present-day efficiency. So it has been with the whole science of radio; it has evolved from a simple beginning. During the early years of radio, development was much more rapid than it is today, greater inventions were brought forth, and more phenomenal results were heard of than now. These early years in radio were the days when MONEY was not an ultimate goal to be striven for, and the great men of those days were real altruists. Their discoveries, and the contribution they gave to the science comprised their reward, and it is true that few of them died rich. Present-day development has slackened. Manufacturers figure everything on a production basis. The production engineer has so far encroached upon the research engineer that he has even influenced the design of apparatus to a great

extent, in order that more pieces could be made per minute.

Where is the efficiency when the trend of modern radio advancement is not in the direction of best results for least expense, but, instead, in the direction of more profit, less service?

What the war hasn't done to the radio game in this country isn't worth mentioning. But out of the clouds of the war is coming a light. MONEY is getting tight, conditions are clinching up, and the market is flooded with goods at one price.

It's all easy to see. As usual, the RIGHT WINS. The parasites of modern radio evolution are getting their own medicine, and are gradually disappearing, one by one. The SUCCESS that they looked for never came. It wasn't what they expected. But it all works out for the good.

ELSEWHERE in our pages is an article by Mr. L. Mott of Catalina Island that deals with "fish stories" by radio. We shall watch with interest the result of Mr. Mott's efforts to broadcast the fishing news from the famous waters about the Island, and we venture the prophecy that inland dwellers, far-removed from the breakers' curl, and the

songs of the salty winds through the rigging, will get a decided thrill at being able to hear, each night, of the day's doings on the Island. We trust that our Southern brothers will take the brick off the key for just a few minutes each night in order to allow Mr. Mott to proceed with the new sport—not for his own good, but for your good, and

your good alone. Get out of the habit of "laying for the fellow with the noisy spark." Sit back in your chair for a while, smoke a big, black cigar and get a kick out of the game for a change. Let the ether smile for a few moments—it's beginning to shrivel up from the effects of the QRM injected into it by the dynamiters of the air.

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Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

VARIOMETERS

(By Robert Velner)

THE latest is variometers. Everybody uses them if they wish to bring in those distant stations. A regenerative receiver requires two variometers,

students a chance to make something in which they are especially interested.

The first consideration is the wood for making the forms. Hard maple is the

istense, with the exception of some rarer woods grown in foreign lands. It is of such a nature that, if well seasoned, as it should be for these forms, it will never shrink enough to cause the wire on the forms to loosen.

Figure 1 shows the rotor, Figure 2 the stator. The dimension B, Figure 1, should be about $2\frac{1}{2}$ inches. Since the usual maple obtainable is not thick enough to make this width, it is customary to glue two pieces of $\frac{1}{4}$ -inch material together. For two variometers two pieces of hard maple, $1\frac{1}{4} \times 4\frac{3}{4} \times 9\frac{1}{2}$ inches glued together, and then sawed in half, to make two pieces $2\frac{1}{2}$ inches thick by $4\frac{3}{4}$ inches square, will be required. The dimension A, Figure 1, will be $2\frac{1}{4}$ inches if the above size wood is used. Throughout this article dimensions for efficient variometers will be given for the grid and plate circuits of a regenerative receiver, but the builder may vary the dimensions to suit his special needs or ideas.

For the stator forms, four pieces (for two variometers) are required, also of hard maple, $5\frac{3}{4}$ inches square by $1\frac{1}{4}$ inches thick. These should be nicely squared up and sandpapered, to make a neat job.

After the wood is procured, templates must be made for turning up the rotor and stator forms and for the winding form for the stator coils. These can be made of cardboard if only two variometers are being made, but should be of sheet iron or steel if a large quantity are to be produced. Figure 1 A shows the template for the rotor form, Figure 2 A for the stator forms, and Figure 4 A for the winding form.

It is advisable to start in with the rotor form. Mount the $2\frac{1}{2}$ -inch glued wood block in the lathe so that it will rotate on centers to make a circular wood block $2\frac{1}{2} \times 4\frac{3}{4}$ inches in diameter. This diameter will allow for the dimension C, Figure 1. After this cylinder has been

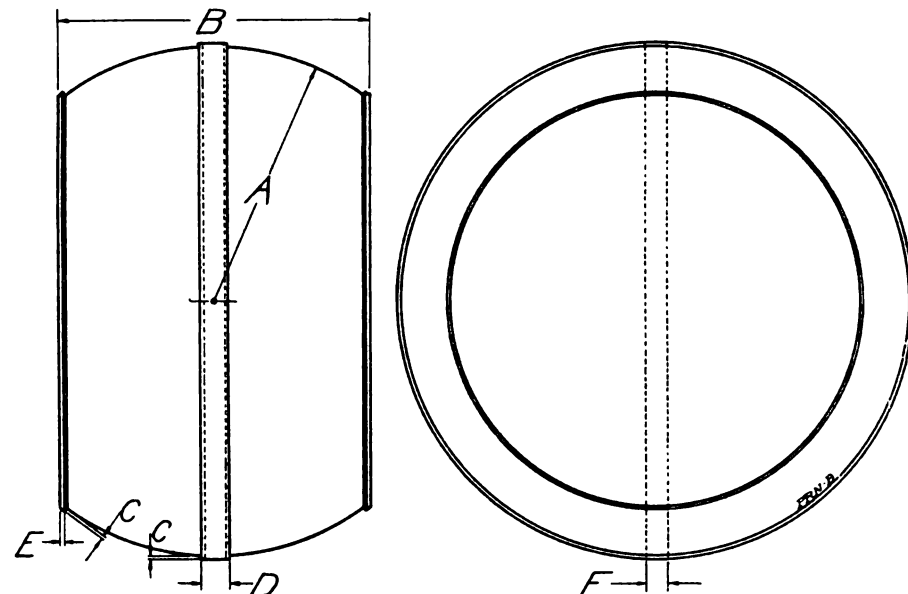


Figure 1 Rotor - Hard Maple

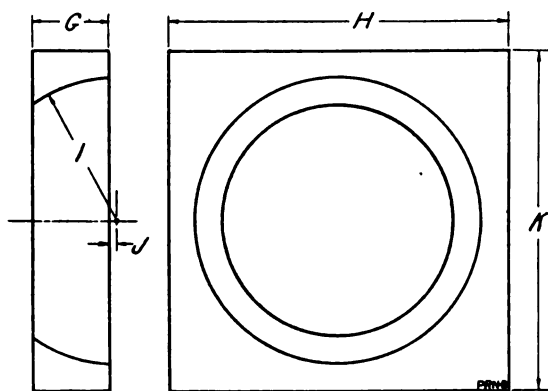
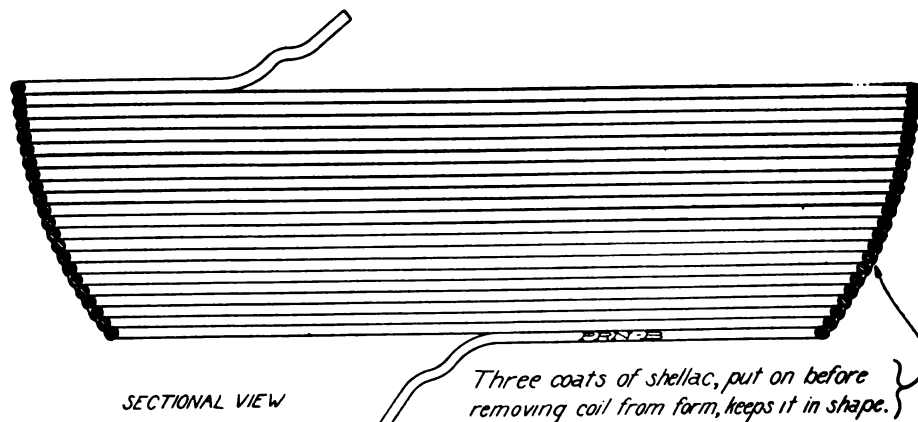


Figure 2 Stator (Half) - Hard Maple

and this type of receiver is the most efficient one for the vacuum tube. Many amateurs enjoy making their own apparatus, and many others cannot afford to buy their equipment "ready made." It is for these amateurs that this article is written.

For the construction of these variometers a small wood turning lathe, just large enough for turning pieces 6 to 8 inches in diameter, is necessary. Many amateurs who do not own lathes can use them at schools, where, if the subject is approached in the right way with the manual training instructor, they can do all the wood work necessary for these variometers. The forms for the variometers certainly are pieces which require more than ordinary care to make right, and the instructor of any class in wood turning should not hesitate to allow their pupils to make them and thus give his

right wood to use, because it is about the closest grained, non-porous wood in ex-



Stator Coil removed from Winding Form
Fig. 3.

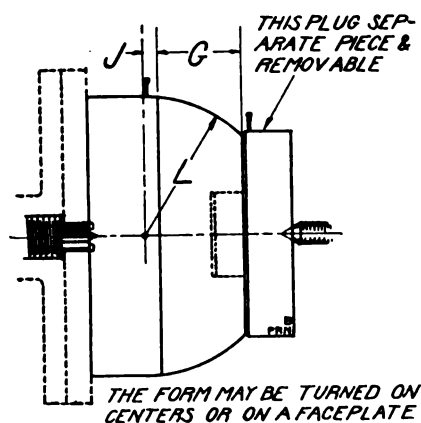


Fig. 4 Form for Stator Coils

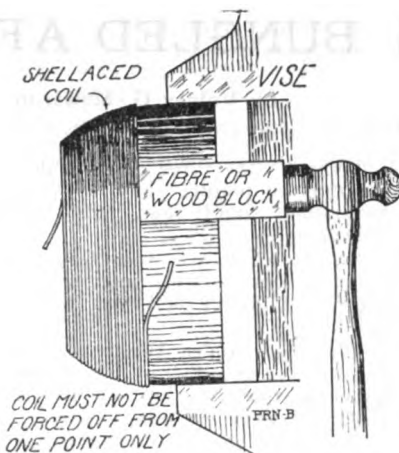


Fig. 5 Removing Coil from Winding Form.

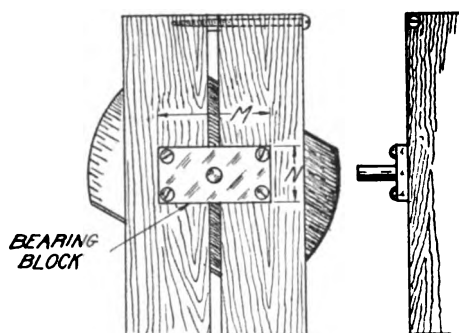


Fig. 6 Variometer Assembled

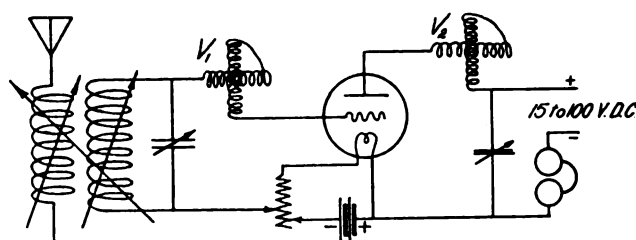


Figure 7 Regenerative Receiver Diagram.

turned out, mark the width of the ridge D, in Figure 1, at the middle of the cylinder. This should be $\frac{1}{4}$ inch. Then turn down on either side of the ridge $\frac{1}{2}$ inch and start to round off the form to the shape of the template. Be careful not to turn too quickly, but take time and use the template frequently. It is easy enough to turn off more wood on the form, but impossible to put more on, once it is below size. In turning maple, which is a very hard wood, tools must be continually sharpened. They must be held very firmly in the hand to prevent turning the form out of round.

When the two rotor forms have been turned, mark two places on the ridge exactly diametrically opposite. These marks are to cote the hole to be drilled through the center of the form. Place a drill in a chuck in the headstock of such size that it will drill a hole to make a drive fit for the brass rod to be used as the rotor shaft. $\frac{1}{8}$ inch round brass rod is a good size, and the drill should be about $\frac{1}{100}$ inch smaller in diameter than the rod in order to make a tight fit. The drill may be tried out on another piece of wood first, to avoid possibility of ruining the rotor form. Center-punch the holes which you have marked at opposite sides of the rotor form and place the form in the lathe, bringing the dead center up until it fits into one of the center-punch holes in the form, the other center-punch mark being close to the point of the drill. Then turn the hand wheel of the tailstock, feeding the drill slowly into the wood

until half through the form. Then reverse, placing the dead center into the drilled hole and drilling from the other side. Caution is to be taken in doing this work. The drill must be sharp and the wood must be fed slowly into the drill. If these precautions are observed, and care is taken to see that the drill starts right in the center of the ridge, satisfaction will be certain.

When the hole is drilled the form may be again placed in the lathe and wound.

edge may be fastened by drilling a small hole about the same size as the wire at the edge of the rotor form. Small holes must be carefully drilled from where the holes come out for the shaft to the outside of the rotor in order to lead one end of the wire to one end of the shaft, which is in two pieces, and the other end of the coil to the other end of the shaft. About one-half of an inch air space in the hole, at the center of the rotor, will

(Continued on page 220)

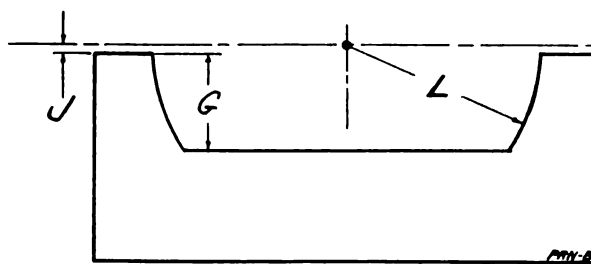


Fig. 4A Template for Winding Form

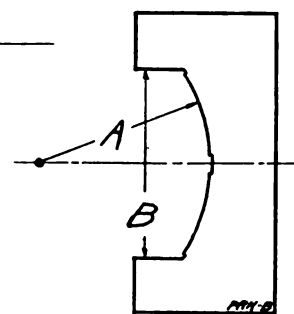
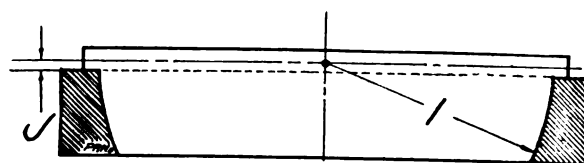


Fig. 1A Template for Rotor Form

Fig. 2A Template for Stator Form
showing section of Stator Form.

A BUNGLED AFFAIR

By Volney G. Mathison

Author of "The Radio Development Association of Hamsville," and Others.

As per schedule, the "Yosemite," small and dirty Pacific Coast steam-schooner, loaded lumber at St. Helens. Also as per regular schedule, the wily and silver-tongued steamer-ticket agents in Portland roped in some fifty or sixty unsuspecting land-lubbers and hypnotized them into parting with quite a number of perfectly good American dollars, in exchange for which the victims received long, pink tickets, entitling them to a "first-class passage to San Francisco on the new, magnificent, and luxurious (?) steamship 'Yosemite.'"

On the day the "Yosemite" was due to sail, the afore-mentioned land-lubbers were herded aboard a little river boat and were taken down the Columbia River to St. Helens, twenty-five miles below Portland. Here they were hustled aboard the dilapidated old steam-schooner, the gangplank and lines were quickly taken in, and the engine-telegraph signaled "full-ahead." By the time the crowd of provincial travelers had awoke to a tardy realization of the fact that they had been victimized, they found themselves out in the middle of the broad Columbia, and very much up against the necessity of staying aboard and making the best of a bad deal.

As usual, some of the more militant of the humbugged ones raised quite a fuss. A particularly strenuous protester was a small, dark-complexioned man, who had a conspicuously nervous manner, and who seemed to be afflicted with a very snarly disposition. He had a small, black satchel, which he appeared to be determined to not let out of his hand for a moment. After poking his nose into his two-by-four stateroom, and then, accidentally, wandering into the sailor's mess-room, where he saw a gang of terrible Finns devouring huge platters of codfish and corned beef, he decided, evidently, that he had seen enough. He demanded to be told where he could find the captain of the vessel, and was informed that the master's quarters were on the upper deck.

Hastening up a companion-way, the angry passenger found an important looking, uniformed young man, who was majestically pacing to and fro on the upper deck. His trousers were freshly pressed and the setting sun was brilliantly reflected in his shining brass buttons and gold bands.

"Hey, what kind of a skin-game do you call this, anyway?" caustically snarled the under-sized stranger, planting himself squarely in front of the promenading officer.

"Er—what's that?" spluttered the surprised knight of the uniform, halting involuntarily.

"Huh! You're a bunch of dirty, cheating, lying, rotten fakirs, and you know it!" stormed the passenger, hotly, as he shook an excited fist under the nose of the astonished listener. "When I bought my ticket for this boat, I asked the agents why she didn't come up to Portland to take on her passengers, and the skunks told me that she was nearly a quarter of a mile long and had to stay down the river where there was room enough for her to turn around in! And they said that she had three captains and five smokestacks and six decks and a big brass band on every deck—!"

"But—!"

"Where's the three dining saloons and the moving picture show? Where's the swimming pool and the ballroom. Where's—!"

"Well, what are you tellin' me all about it fer?" sharply interjected his listener. "I didn't sell you your ticket, did I?"

"No, but you're the captain of this steamship, aren't you?" snapped the buncoed one, glaring at the officer's glittering gold buttons.

"No, I'm the chief radio operator," announced Peter Bockstrup, with dignity, drawing himself up to his full height.

"Piffle!" snorted the disagreeable stranger, and he went away.

Feeling a good deal irritated because of this affront, Peter Bockstrup started toward the wireless room. Upon going to it, he found another passenger standing in the doorway and looking in at the radio equipment. He was a tall, well-built man, with a rather hard, yet not unattractive face, which was slightly disfigured by a small birthmark on the left cheek.

"Pardon me," he said, easily, stepping aside as the chief wireless operator approached, "I was just taking the liberty of glancing in at your apparatus."

"Oh, that's all right," answered Peter Bockstrup, unconsciously contrasting the man's agreeable and somewhat distinctive manner with the nervous and snarling disposition of the small stranger whom he had just encountered. "Come in an' sit down awhile if you want to."

"I will, thanks," responded the passenger, with alacrity, stepping inside. "There doesn't seem to be any place for one to go and while away the time on this steamer—her passenger accommodations are hardly to be called attractive, to my notion."

"Yep, that's right," agreed the chief wireless operator, proffering a broken-down chair to his visitor. "In fact, this scow's so darned cramped up a fellow can't hardly get out of his bunk in the mornin' without fallin' overboard."

The stranger laughed, appreciatively, and thus the ice was broken. Peter Bockstrup found the passenger, who said his name was Collinge, to be a pleasing talker. He gave an impression of having traveled extensively and seen much, his observations were interesting and he conversed freely on many subjects, yet, when talking directly about himself, he exhibited a peculiar reserve, which the chief wireless operator could not understand.

It was almost midnight when Collinge left the wireless cabin and went to his stateroom.

Shortly afterward, the "Yosemite" slowed down abreast of Astoria and the river pilot was taken off by his launch. Two hours later, the little steam-schooner crossed out over the bar and set her course for San Francisco.

When Peter Bockstrup arose at six o'clock in the morning to relieve his second operator, he found the ship bucking into a strong, southwesterly gale. A sixty-mile wind had whipped the ocean into long lines of high, white-capped seas, among which the old steam-schooner was rolling and pitching violently. Going into the radio room, Peter Bockstrup discovered his assistant seated

in the middle of the floor, clasping a fire-bucket firmly between his knees, into which he was involuntarily ejecting food-stuffs at frequent intervals. Even the chief wireless operator, seasoned veteran that he was, with four months of sea service to his credit, had a rather uneasy feeling in the pit of his stomach.

The gale increased in fury. The "Yosemite" began to ship seas, which shook her from stem to stern, and which sent clouds of salt spray flying along her decks. Peter Bockstrup thought of the disagreeable stranger who had so rudely accosted him the evening before, and the chief wireless operator laughed to himself as he mentally pictured the unhappy passenger being tossed around in his uncomfortable bunk. Peter Bockstrup did not have any doubt but that the fellow was thoroughly seasick, and, therefore, he was greatly astonished when the wireless room door was suddenly jerked open and the very object of his thoughts squeezed inside. He was dripping with water, having evidently been drenched while clambering up to the upper deck upon which the radio shack was located. In one hand he tightly gripped the small black satchel which he had brought aboard with him, and his face was an ashen gray.

"There's a dangerous crook on board this ship, and I want to send a message to the police!" he burst out, shivering as though with an ague, and the cringing, terrified manner in which he spoke was in remarkable contrast to his caustic, snappy style of the evening before. "He doesn't know that I'm carrying this—" he indicated the satchel in his hand, "—and if he should find out about it, he'd surly do away with me and steal it!"

"Steal what?" queried Peter Bockstrup, puzzled.

"I'm a special messenger of the De Lacey Detective Service," answered the passenger, nervously glancing over his shoulder, "and I'm carrying a package of jewelry from the Ellingsworth vaults in Portland to Mrs. Ellingsworth in San Francisco. She expects to wear the jewelry at some reception affair next week—but she never will though, if Lone Lambert discovers that I have it here with me—!"

"Lone Lambert!" broke in the chief wireless operator, interrogatively.

"He's a big man with a small birthmark on the left side of his face," said the queer passenger, with another nervous shiver. "He looks and acts somewhat like a gentleman traveler, but he's only a desperate crook, however."

"Birthmark! You mean Mr. Collinge!" ejaculated Peter Bockstrup, incredulously. "You're out of your head, I reckon."

"No, I'm sure he's Lone Lambert," whined the other. "I saw him once quite a while ago when he was running an oil-stock swindle and some other fake promotion schemes. Things got too hot for him in that line, as it was discovered that he had a record for clever robberies and crookedness as far back as they could trace him. He's wanted by the police of a dozen cities."

"Well, you might be right, but I reckon you're all wrong, because only rubes an' hicks get fooled into comin'

aboard this five-smokestacker," affirmed Peter Bockstrup, with a faint smile. "And, anyway, if the jewelry stuff's worth so much, why didn't you send it by express?"

"That's none of your business," snapped the passenger, smarting under the implied sarcasm and forgetting his fright in his rising anger, "I came here to send a message—not to argue with you!"

"All right, all right," hastily answered Peter Bockstrup, and he handed the passenger a pad of sending blanks.

The passenger took a note-book from his coat pocket, and consulting it frequently, he wrote out a message, composed entirely of code words.

"It's to a private address," said the chief wireless operator, looking at it.

"That's a special police address," responded the messenger, shortly.

Peter Bockstrup checked the telegram.

"Forty words," he said.

"That'll be six dollars and fifteen cents to Frisco."

The passenger paid the charges and went out.

The chief wireless operator called up the naval station at North Head and sent the message. He had just finished when Collinge rapped on the door and came in.

"Was that sneaky-looking little fellow in here a few minutes ago filing a telegram?" he asked, sharply, motioning toward the pad laying on the operator's desk.

"Er—yes," answered Peter Bockstrup, with some hesitation, "but I can't tell you nothin' about it—it would be against the law." He prudently covered the pad with his hand.

"Oh, that's all right, you don't need to—the mere fact that he did send a message tells me all I wish to know," replied Collinge, with a strange, hard smile. "I'd wager a hundred dollars to a dozen Russian rubles that he's got stolen goods in his possession again."

"Stolen goods!" ejaculated Peter Bockstrup, astonished. "Isn't he a special messenger, then?"

Collinge laughed, shortly. "Did he tell you that?"

"Yes, he did," blurted out the chief wireless operator, half involuntarily. "And he said he was takin' a bunch of jewelry to Frisco for a woman to wear at a party next week!"

"Humph! That's a good one," Collinge chuckled, grimly. "Lone Lambert a special messenger. Ha ha!"

Peter Bockstrup's eyes opened wide with amazement.

"You say his name's Lone Lambert?"

"Yes, why?"

"But—er—gosh!" spluttered the astounded chief wireless operator. "That's who he said you was!"

"Well, I'll be damned!" exploded Collinge, and he laughed, heartily. Then he drew back the lapel of his coat, revealing a Pinkerton detective badge.

"You're a detective!" gasped Peter Bockstrup.

Collinge smiled.

"Supposed to be one," he replied.

"Yet, I really didn't even know that Lone Lambert was on board until I happened to see him duck into his stateroom a few minutes ago."

There was a pause.

"As I was intending to say before, you shouldn't have sent that telegram," Collinge continued, "but, of course, it's too late, now. Give me the pad and I'll write out one for headquarters, so that they'll be ready for us when we dock at San Francisco."

Peter Bockstrup handed the message pad to Collinge. Like the nervous passenger before him, he took out a note-book and consulted it to obtain code words, which he wrote down on the blank. The chief wireless operator observed that Collinge's telegram was also to a private address. He started his motor-generator, got hold of the station at North Head again, and sent the message. Collinge stayed in



"Keep quiet, Jack Lambert," he grated, in a steely tone, drawing a big automatic from his coat pocket."

the wireless room until Peter Bockstrup had signed off, and then he went out.

About fifteen minutes later, just as an unusually violent wind-squall struck the "Yosemite," causing her to pitch and lunge more wildly than ever before, the chief wireless operator heard the beckoning whistle of the speaking-tube connecting the radio cabin with the ship's bridge.

"Hello there," he answered, taking the tube off its hook.

"Say, Sparks"—it was the captain's voice, barely audible above the howling of the storm—"your wireless gear bane gone overboard! It carried away, fore an' aft, both together at vunce an' vent all over the side! You bane come out an' have a look, quick!"

"All right," answered the chief wireless operator, and he made for the door. With difficulty, he forced it open against the wind, and went outside. The gale

was blowing with such fury that he was obliged to cling to the deck railing in order to keep his feet. He looked up at the ship's masts and saw that his aerial had entirely disappeared. Even the lead-in wires had broken off, near the roof insulator, and were gone.

As he stood clutching the iron railing with both hands and staring up at the bare sticks, he became aware of the fact that Collinge was at his side.

"It's darned queer that your whole antenna went overboard at once," he shouted, his voice almost drowned by the roar of wind and water. "Let's go and look at the halyards."

Holding onto anything offering a hand hold, the chief wireless operator and Collinge made their way to the main-mast shrouds. There they found the manila aerial halyard still fast in the rigging, with a short piece hanging down. Collinge seized the end of the rope and examined it.

"Look!" he shouted, showing it to his companion. Peter Bockstrup looked and saw at a glance that the rope had been severed with a sharp knife. Waiting until there was a slight lull in the storm, the two investigators hurried over the lumber deck-load to the foremast rigging. The fore aerial halyard was found to have, apparently, been cut half through, and to have then broken.

"What do you know about that for slick work!" exclaimed Collinge, sharply. "He cut this forward halyard almost in two, so it was barely holding, and then he went aft and cut the other one away altogether and thus sent the whole thing flying over the side!"

"You mean that Lone Lambert done it?" queried Peter Bockstrup, dismayed.

"Of course he did it," answered Collinge. "It was easy, as there's nobody on deck in this weather. The man at the wheel has his hands full trying to keep the old tub somewhere near her course, and the mate on watch seems to be staying inside. Lambert could

easily have done this without anybody's noticing."

"Yep, I reckon that's right," assented Peter Bockstrup, gloomily, and the pair clambered back aft over the deck-load.

"Is there any way to mend it?" queried Collinge, in a worried tone, when they were back in the wireless room.

"No, not just now anyway," answered the chief wireless operator, dejectedly. "Nobody can get up to where the aerial halyard blocks are an' reeve new ropes in this storm. Anyhow, I haven't got no aerial wire or insulators or anythin'. I'd like to know what that ornery plug went an' cut the aerial away for, in the first place."

"That's easy to explain," responded Collinge promptly. "He simply fears that the police have followed his trail to where he boarded this boat and he knows that if this should happen to be the case, the captain would soon get a message ordering his arrest."

(Continued on page 219)

DOWN TO THE
MINUTE

Current Radio News

UP TO THE
STANDARDRADIO COMPASS SYSTEM IS A
SUCCESS

AFTER a test extending over two months the radio compass control for shipping entering Golden Gate has been brought almost to perfection, according to reports by the naval authorities in charge of the system. The eight stations established around the entrance to San Francisco harbor are all in excellent working order and two more have been added to the San Diego district.

Although the masters of vessels entering this harbor have been slow in taking advantage of the new service, which began on September 15th, the records show that 342 vessels have received their bearings from the land stations and the central location at the Farallones, during October. It is expected every ship approaching the Golden Gate in foggy weather will make use of the free service furnished by the Navy Department in the near future.

Despite the difficulty experienced in obtaining a sufficient number of operators to take charge of the stations at the start, the navy has now a highly trained corps ready to give accurate information to mariners. The greatest variation recorded in the compass readings since the stations were established was only two miles. These discrepancies were made at the beginning of the new system when captains of vessels were not familiar with the methods of determining positions by means of the wireless compass stations.

The Dutch steamer *Moerdyk* was saved several hours recently by the use of the compass control. The vessel had decided to anchor two miles off the South Side Life Saving Station to await the lifting of the fog. When the captain received a message from one of the stations offering to give the location of the ship he was enabled to make port without anchoring.

The radio compass stations are in charge of Lieutenant Commander S. D. McCaughey, and are located at Point Reyes, Bird Island, Farallones, Point Montara, Point Arguello, Point Hueme, Point Fermin and Eureka.—San Francisco "Call."

ARMY CALLS FOR
RADIO OPERATORS

Thirty expert radio and telegraph operators are wanted by the Signal Corps, U. S. Army, for duty on the Washington-Alaska cable and telegraph system, according to an announcement received at Camp Lewis from the office of the chief signal officer, Washington, D. C. Enlistments are wanted at once, the

announcement says, and the men will be sent to the 8th Service Company, Presidio, San Francisco, for basic military training, instruction in office management, money transfer papers and duties necessary to the proper performance of duty on the Alaskan system. From there they will be sent to Fort Lawton, Wash., for assignment to an Alaskan station in the spring.

Only first-class radio and telegraph operators with commercial experience will be considered, it is stated.—Tacoma "Ledger."

"WEARING OF GREEN"
ANGERS GREAT SNAKE
Efforts of Wireless Operator to Soothe
Reptile Drive Him Overboard

THAT vessels with cargoes of wild animals should not put to sea unless equipped with a wide assortment of music was demonstrated aboard the British freighter *Bolton Castle*, which arrived at New York recently from China with the story of an unsuccessful attempt to soothe a huge boa constrictor with the music of a phonograph inadequately supplied with appropriate records.

The snake, said to have been thirty-five feet long, broke from a crate in the ship and after knocking the helmsman away from the wheel, wove its body in and out among the spokes, throwing the ship off its course and alarming officers and crew.

The wireless operator sought to pacify the serpent with music, and rushing to his cabin he returned with a talking machine and a record which he mistook in the dark for "Hindustan." The record turned out to be "The Wearing of the Green," and the music of snakeless Ireland served only to aggravate instead of calm the snake. Spurred on by the blows of axes and revolver bullets, the reptile finally plunged over the side of the ship and disappeared.

It is declared that the wireless man has not yet lost faith in music as a medium for taming wild animals, but insists that before he ships with another cargo of snakes he is going to lay in an assortment of talking machine records of real snake music.—New York "Globe."

RADIO OUTFIT RECOMMENDED
FOR SEATTLE HARBOR

ADoption of a plan whereby the Seattle Harbor Department would be equipped with one of the most powerful radio apparatus on the Pacific Coast, capable of transmitting and receiving messages a distance of 2,500 miles, was

recommended to the Council finance committee at its session recently by Fred M. Lathe, port warden.

The Harbor Department now operates a radio apparatus supposed to reach points within a radius of 500 miles of Seattle, but as a matter of fact effective for considerably less than half that distance, according to Lathe. Messages are exchanged with incoming and outgoing vessels, the plant being in charge of four wireless operators employed by the city. The service is valuable not only to the Harbor Department, but to shipping interests, as several shipping men testified at the committee meeting.

Under a recent order by the federal radio inspector for this district the Harbor Department's wireless plant will be required to accept all commercial business that may be tendered in the future. This makes necessary installation of more powerful apparatus, harbor officials declare. In an offer transmitted to the Council finance committee recently by the port warden, the Independent Wireless Company agrees to install an up-to-date instrument guaranteed to have an effective radius of 2,500 miles if the city will furnish the operators and maintain the service, the city to divide the gross revenue of the business on a fifty-fifty basis.—Seattle "Times."

PRESS USE OF UNITED
STATES RADIO ASKED

Washington, Dec. 22.—(By Universal Service.)—Press associations and metropolitan newspapers asked Congress to open naval wireless stations for transmission of news to and from Europe under a contract system which will enable them to effect a definite arrangement that will afford relief from the present deplorable lack of facilities.

Testimony of representatives of these organizations before the House Merchant Marine Committee disclosed the utter inability of privately owned cable and radio companies to handle press matter within a reasonable time.

The companies have all the commercial business they can handle, it was conceded by spokesmen for the Radio Corporation of America and the International Radio Company and they are unable to facilitate transmission of news. Conclusive proof was submitted that press dispatches are frequently delayed from eight to twenty-eight hours in reaching the United States, which makes them practically valueless.—San Francisco "Examiner."

Turn to page 203 and give the special offer your best consideration before you lay this issue aside.

"GRID BIAS" AND THE GRID-LEAK CONDENSER

By H. Tenny

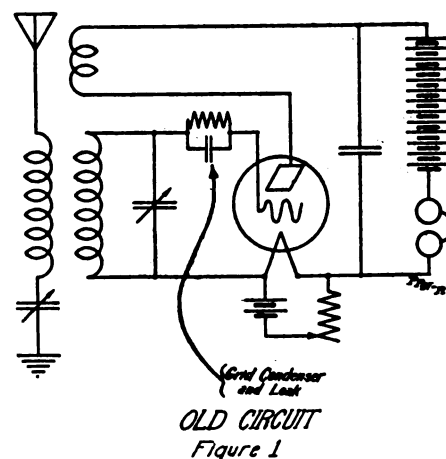
(If you use a vacuum tube you will need to read Mr. Tenny's article carefully, and use this method of providing a negative potential on the grid with respect to the filament, thus eliminating the grid leak and condenser.—Editor.)

AS the subject of a great deal of propaganda of late, the grid condenser, and its running mate, the grid leak, have become to the average amateur and experimenter a nearly indispensable adjunct to the already overburdened receiving circuit using the vacuum tube.

The successful elimination of these familiar stand-bys has been accomplished in a simple manner in the latest and most practical circuits developed and adopted for government use. This is done by arranging the grid-filament secondary circuit in such a way as to cause a definite and constant difference of potential between the grid and the filament.

Figures 1 and 2, with attendant notes, illustrate the principle. The adjustment of the grid connection, as shown, introduces this bias. The negative potential is determined by the point along the filament rheostat at which the grid circuit terminal is connected. In the present practice the adjustment is usually made to effect about a 15 volt bias, which is correct for most receiving tubes now in use, but for the experimenter it would be advisable to make this variable in order to permit quantitative observations being taken.

From experiments and tests by the author the following conclusions were obtained with regard to the new system:

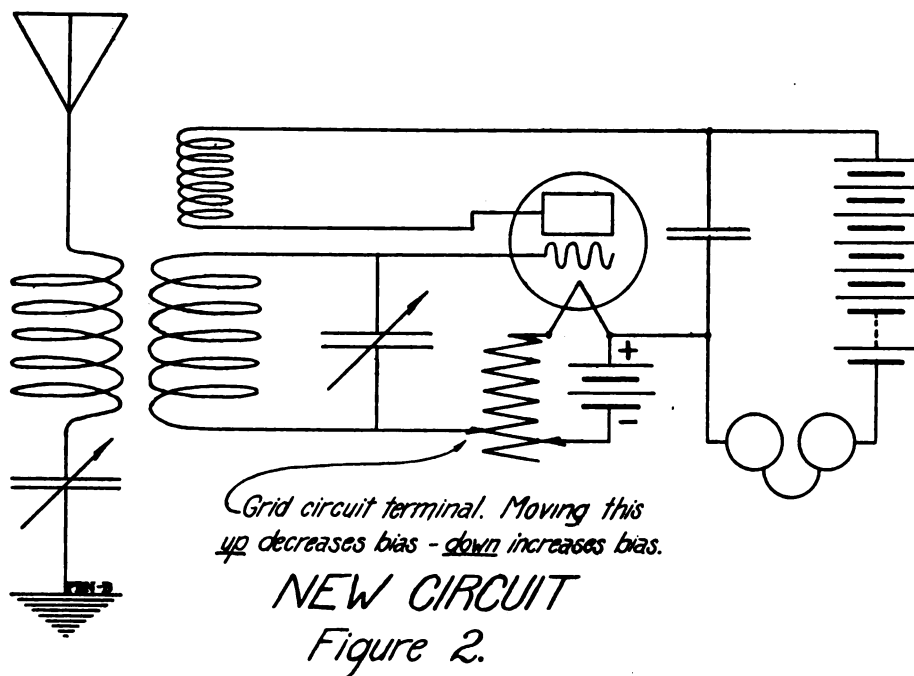


Grid-Leak and Condenser

1. Condenser requires adjustment for different wavelengths.
2. Using leak weakens signals to greater or less extent.
3. Leak dampens oscillations.
4. When not using leak, signals loud but bulb "squawks" at critical adjustment.
5. Unless receiver is shielded, capacity is caused by movement of the hands and nearby conducting bodies.
6. Grid condenser and leak involves two additional pieces of apparatus and panel space for same.

Grid Biased

1. No adjustment required.
2. Signals amplified by proper bias voltage.
3. Bias facilitates oscillations.
4. Signals with bias always loud and bulb never "squawks" at any adjustment.
5. Capacity effect is prevented whether shielded or not.
6. Bias is accomplished by slight change in the wiring, without any additional apparatus.



ANOTHER HONOLULU TEST IN FEBRUARY

A RECENT communication received from Mr. M. A. Mulrony, expert radio aide at the U. S. Naval Radio Station, Pearl Harbor, T. H., states that arrangements are being made for conducting another Hawaiian transmitting test on the nights of February 5 and 6, 1921. The time for the tests has been set at

6:45 p. m. Honolulu time, running over a period of twenty minutes on both occasions. When it is 6:45 p. m. in Honolulu it is 9:15 p. m. in San Francisco. Mr. Mulrony states that it is his desire to limit the number of contestants to four per night, allowing a testing period of five minutes* to each contestant. A

short message will be transmitted, copies of which will be mailed to the contestants from this office. Applications from prospective contestants should be sent to the office of the "Pacific Radio News" promptly and we will proceed to make telegraphic arrangements with Mr. Mulrony.

NEW PHONE SERVICE ANNOUNCED

Announcement was made recently at headquarters of the Twelfth Naval District that conversation by telephone with aviators in the air, or ships at sea, will become a reality within a few weeks

through a wireless extension of the naval radio apparatus now being installed at South San Francisco.

San Franciscans will be able to ask long distance to connect them with "Captain So-and-So," en route to Reno by

air, or with "Friend Wife," due here on a steamer. And they will get the connection and talk with the party desired as they would with someone in some other part of the city.—San Francisco "Recorder."

NEW STATIONS OF THE FEDERAL TEL. CO.

(By Haraden Pratt, Acting Chief Engineer of Federal Telegraph Co.)

PRIOR to the world war, the Federal Telegraph Company, having its factory in Palo Alto, operated a chain of radio stations giving communication between all the principal cities of the Pacific Coast in the United States. Immediately upon the declaration of war in 1917 these stations were requisitioned by the United States Navy Department for military purposes, and the Federal Telegraph Company at that time made arrangements whereby its telegraphic service was continued between the cities in question through the use of land wire telegraph circuits leased from telephone companies for the purpose.

During the course of the war the equipment of these various radio stations was purchased by the government and in several instances removed or altered for military purposes, so that at the close of the conflict the Federal Telegraph Company was not in a position to return to the use of radio for conducting its inter-city telegraph service.

The company has recently effected arrangements for the erection of the necessary radio stations to permit it to again utilize radio for conducting this coast-wise business, and active construction has commenced on the first two units of this work, namely, the erection of two radio transmitting stations, one located near Portland, Ore., and one located near San Francisco.

Facilities Improved Since War

The engineering department of the company is taking advantage of this opportunity by erecting radio stations which will contain equipment capable of rendering far better service and handling a much larger volume of commercial traffic than was possible with the facilities in use prior to the war. The stations are first-class and modern in every respect, and are being equipped with Federal arc radio transmitters of the most modern design.

The most conspicuous and predominating physical feature of these stations consists in a 626-foot guyed steel tower of new and novel design and presenting several interesting features from an engineering standpoint. This tower consists of a latticed steel shaft six feet by six feet square, rising perpendicularly from a ball and socket joint at the ground, upon which it rests. Five sets of steel cables attached to massive concrete anchors are used for supporting this structure in a vertical position.

An umbrella type of antenna system having a diameter of approximately 3,000 feet is utilized for generating the neces-

sary waves to be used for the transmission of radio signals. This antenna system has its center supported on the top of the 626-foot tower, just described.

The station near Portland is being erected on a tract of land bordering the Tualatin River, near the town of Hillsboro, Washington County, at a point approximately eighteen miles from the city of Portland. Radio operators located in the company's offices in the heart of the business district of Portland will control two radio transmitters located in this station. This method of control will enable messages to be transmitted from the station at the same time that messages are being received in Portland, thereby providing facilities for quadruplex operation, since there will be two receivers and two transmitters capable of simultaneous use.

Palo Alto Station Being Built

The station nearest San Francisco is being erected on a tract of salt water marsh land east of Palo Alto. Special construction at this place will be necessary for securing the required strength of foundations for supporting the steel tower and the radio station power house. The operators who will control the two radio transmitters in this station will be located in the company's telegraph offices in the business district of San Francisco.

The completion of these two stations in the early part of 1921 will see the inauguration of a reliable, efficient and high speed quadruplex radio telegraph service between the cities of San Francisco and Portland.

The Federal Telegraph Company, prior to and during the period of the war, built and installed a large number of radio equipments for the following radio stations: Radio, Va.; Darien, C. Z.; San Diego, Calif.; San Francisco, Calif.; Pearl Harbor, T. H.; Heeia, T. H.; Guam; Cavite, P. I.; Cayey, Porto Rico; Sayville, Long Island, and Annapolis, Md., the latter being a 500 k. w. plant. There has just been completed and passed into operation the largest radio station in the world, equipped with Federal arc radio apparatus in duplicate of 1,000 k. w. at the Lafayette radio station, near Bordeaux, France. This company is also manufacturing 300-2-k. w. radio transmitters for installation on vessels of the United States Shipping Board. A large number of these vessels have already been equipped. In addition to these, a number of 2-k. w. Federal arc radio transmitters are being used by the United States Postoffice De-

partment in connection with the trans-continental air mail service.

BOOK REVIEW

Federal Arc Radio Transmitters. Manual for Radio Operators. Part 1 and Part 2. Published by the Federal Telegraph Company of San Francisco. First Edition, 1920. Part 1 contains information on General Principles of Radio Communication as applied to Arc Radio Transmitters. Part 2 is a description and instructions for the care and use of 2 KW Federal Arc Radio Transmitters, Models "K," "Q" and "X" and the 5 KW Federal Arc Radio Transmitter Type CT-1201 for ships and small land stations. The Manual contains 37 illustrations and half-tones of arc transmitters, circuits, maps and hints on arc operation. Price, \$2.50 per copy, post-paid anywhere in the United States. For sale by Pacific Radio Publishing Company.

PLAN TO MARKET BY WIRELESS MESSAGES

San Diego ranchers are to be informed of market conditions and prices by means of government wireless, according to report from Washington, where it is stated such a plan is to be tested by the Department of Agriculture in co-operation with the Bureau of Standards. The experiment is to be tried in half a dozen Maryland and Virginia counties adjacent to the District of Columbia, and if successful will be extended over the country.

The plans contemplate the eventual use of seventeen wireless stations over the country. The wireless news of market conditions and prices will be sent broadcast, and arrangements will be made with numerous private licensed operators who would aid in distributing the reports to farmers and others interested in the territory covered.—San Diego "Tribune."

The address of the station operated by A. E. Ekdale (6ACY) is 115 North Chester Avenue, Pasadena, Cal., instead of Los Angeles, Cal., per our January call list.

STATION LICENSE SUSPENDED

The station license of L. J. Reidman, 61F, 83 N. Euclid Ave., Long Beach, Calif., has been suspended for ninety days. Reidman was found guilty of operating a station on an excessively broad wave, and causing interference with commercial and naval business.

Arc Radio Apparatus

By Jennings B. Dow

Published by Permission of the Secretary of the Navy

PART VI

IN as much as ordinary microphones are incapable of handling more than 0.2 or 0.3 ampere at the most at a voltage of about 20, several microphones in series must be used to handle anything but the smallest fraction of an ordinary arc's output. Twelve telephone transmitters mounted upon the concave side of a wooden bowl (the kind used for culinary purposes will serve the purpose admirably) have been used with considerable success. Such an arrangement will modulate about 36 watts of antenna energy which should make possible reliable radiophone communication over a range of about twenty miles, and with good amplification at the receiving station, no difficulty should be experienced in increasing this range to forty miles.

A form of microphone with which the author has had some success as far back as 1913 was constructed as follows: Two concentric brass tubes about six inches in length, the larger one having an inside diameter of one inch and the smaller one an outside diameter of $\frac{7}{8}$ inch were arranged vertically. The larger one had a hopper at its upper end into which iron filings could be placed, and the smaller one was closed at both ends and fitted up for water circulation. A winding of six layers of No. 28 DCC magnet wire was wound upon the outside tube and this coil was placed in the plate circuit of two small De Forest vacuum tubes (Type S). The grid circuit was controlled with an ordinary telephone transmitter. The current variations in the plate circuit resulting from the telephone control of the grid circuit altered the magnitude and intensity of the magnetic field between the tubes. As the iron filings passed between the tubes, their flow was regulated by the field, and the resistance of the path between the two electrodes (tubes) which were connected across the antenna inductance was varied over a considerable range. This device had a resistance of approximately 10 ohms when 100 milliamperes were flowing in the field coil of the device, and this resistance in-

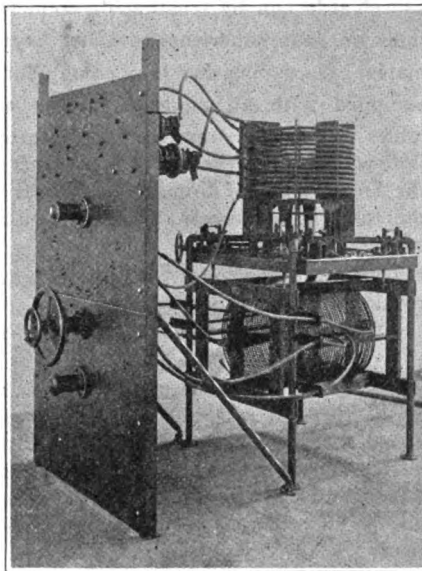


Fig. 3-A

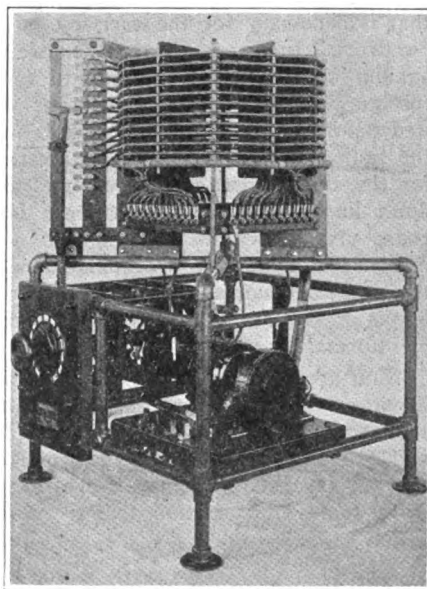


Fig. 4-A

creased to approximately 80 ohms with zero current. Because of these characteristics and the water cooled electrode, it was possible to control 400 watts of antenna energy which was, at that time, considerably more energy than was ever

Description of wave Changer and Inductance System for Federal Telegraph Co. 20 K. W. Arc Transmitter Fig. 3-A.

Upon the panels are mounted the wave changer switch and switch for controlling the magnetic field of the arc during the starting period. The two hand wheels operate the switch arms by means of a chain and sprocket arrangement. Note the large pedestal insulators which support the switch points for the high potential end of the loading inductance. The lower inductance is wound with bare stranded copper cable, and is used for the finer adjustments of wavelengths. It is inserted in the circuit between the arc and the loading coils which are mounted above. These loading coils are wound with a special "Litz", well insulated.

The key system for this particular apparatus is of a type commonly found in the large high power installations. It may be seen just below the loading coils, and consists of a spiral winding of heavy "Litz" inductively coupled to the loading coils, and may be short-circuited by the heavy duty relays mounted at the corners of the frame-work.

Description of Wave Changer and Inductance System for Federal Telegraph Co. 5 K. W. Arc Transmitter, Fig. 4-A.

The wave changer switch may be seen to the left and the leads to it are made from the taps brought out from the loading inductance above. There are three switch arms; the one nearest the control handle regulates the larger divisions of inductance; the middle one, the power absorbing resistance, and the third one, the smaller divisions of loading inductance. To the right of the wave changer is the interrupter or chopper which makes possible the transmission of wave trains whose reception is possible without heterodyning the received signal. It is simply a motor driven commutator which intermittently shortcircuits the single loop of heavy Litz around the lower section of the loading inductance. Several other connections for this device are possible but it operates most satisfactorily here.

controlled by a dry microphone previous to it. The arc quenching feature of the magnetic field also entered into the success of the device, for, without it, disagreeable arcing took place.

(Continued on page 224)

CRITICISING THE DEP'T. OF COMMERCE—UNJUSTLY

(By Arthur H. Lynch)

COMMERCIAL radio men have the peculiar faculty, if it may be so termed, of talking "shop" just about every time they meet. At times it is tiresome, but for the most part it is very instructive and keeps them pretty well aware of what is going on throughout the art.

Sometimes they visit with each other while in the same port and run over old times. In theaters and other places of amusement they come across each other, and even though not acquainted, may have a great deal in common.

Two or three fellows get together in a foreign port and start off for a good time, and before they have gone very far they are met by several others who join them. Perhaps they wander along to the veranda of one of the cafes overlooking the public square in Tampico to hear a good band concert and partake of a little liquid cheer, or they find comfortable tables on the roof of the Plaza Hotel in Havana.

One thing is certain when such a gathering takes place. No matter how much good comes out of the conversation, you may bet your bottom bread-getter that someone is in for a severe and often well-deserved tearing up of the back. Not that the fellows do not do the same tearing when the individuals under consideration are encountered. There are but few who have not the courage of their convictions.

It was at one of these impromptu conventions that the following "razzing" was meted out to the Radio Service of the Department of Commerce. From the standpoint of the radio officer, there are many things wherein the department has seemingly fallen down, but in this particular instance it was slammed unjustly and the object of this article will have been gained if, when the "razz" is being given, the "razzer" is sure of his subject.

A short time ago a very heated discussion was heard, wherein the old-time radio man, who really should have known better, got up before some other radio men and forthwith outlined his views regarding the Radio Service of the Department of Commerce.

These are not his exact words, but an accurate account of the thought expressed.

"Just how is it that every other department on a ship goes to sea entirely equipped with all the information necessary for the carrying on of its work, while the radio officer has to get along as well as he can by trusting to good fortune or past experience? Look at the mates! On sailing day they come aboard equipped with all kinds of charts and tables and every other kind of information which they receive for nothing from the Department of Commerce. What do the radio officers get? Nothing, with a capital 'N'!"

These remarks met with little interruption, and he proceeded,

"Why, we don't even have a list of ship and shore stations, and it is next to impossible to worm out any information in the form of rate sheets. We are supposed to have a Berne List aboard, with all the supplements, but did you ever see one on any of the ships you have been on?" Of course, very few had seen them.

"If the Department of Commerce would instruct the radio inspectors to see to these things it would be a whole lot better for us. It doesn't seem fair to supply one of the ship's departments with all the necessary information and supply another department with none. It is up to us to bring this matter to the attention of the department and get all that is necessary for the carrying on of our work. Just imagine what you are up against when the ship is going to some foreign port which you have never visited before and the 'Old Man' sails into the radio room with a docking message for the ship's agent at the port and you don't know whether or not there is a coast station within leagues, and you most certainly are not acquainted with the land line charges, as there are no call books or rate sheets or any other source of information at your disposal.

"You are just about out of luck, and if you go calling CQ and ask some other steamer for the dope, the man you ask will probably be in about the same fix as you, and then you may expect a Svc from some other station telling you to QRX."

A Tip or Two

The fellow was given a chance to get through his little talk and was then wised up to some of the facts given here, which may be of value to some other men who are of the opinion that there are no sources of information on radio matters.

To begin with, a radio officer who sails without a copy of "Radio Communica-

tion Laws of the United States" is leaving himself open to attacks which he will have no means of combatting. This book may be had at any radio inspector's office. In addition to having a copy aboard, a fellow should have a great deal of the matter contained therein locked up in his memory. One item which seems to have been given very little consideration appears on page 56. It is Regulation 71 and says, in effect, that vessels in foreign or trans-oceanic trade shall have as part of their equipment a copy of the official Berne List and supplements thereto as issued.

Most of our vessels, engaged in such service, are under the supervision of the Shipping Board, and the board's radio supervisors will supply men with this list. Part of the radio inspector's duty is to see that the list is aboard, but because he does not always enforce this regulation is no reason for the ship being without the list. The radio inspectors have their own troubles.

One service of our government which seems to have been completely overlooked is the Hydrographic Office. Before sailing it is generally possible to find out what the itinerary is to be; the Master has to know it in order to get his charts. Find out where you are going and then go to the Hydrographic Office and secure the charts covering the section of the world you are going to visit. They will cost you nothing and they will indicate the location of the coast stations, and will furnish a great deal of information which will be of value and interest.

Another source of very valuable information is the complete book of regulations issued by the Naval Communication Service. Published in loose leaf and accurately indexed and bound with a stiff cloth cover, this book is very handy to carry. It is not large and contains about all the information a fellow needs. It is issued without charge and may be found aboard ships formerly under navy control.

It is not a good policy for radio officers to buy necessary parts of their equipment, and even though there are times when such purchases would serve the individual well, the safest way is to do his best with what he is given. This is not as "tight" as a first thought might indicate. Everything necessary may be secured from the various sources of supply, and even though individual ships are given better service by certain activities on the part of the men, such as the installation of vacuum tubes, the craft in its entirety is better off without them until they are made standard units of

(Continued on page 226)

THE SPARK-TUBE TRANSMITTER

(By H. Tenny)

THE most recent experiment conducted by our foremost radio men was a series of tests for the compilation of data on a new type of radio transmitter, known as the "Spark-Tube" system. Comparison with other types of apparatus, including the Poulsen arc and the Navy quenched spark, showed a superiority for this system that was truly amazing, and more so when it is considered that the new system is as yet in its infancy of development.

Of more interest to the progressive amateur experimenter is the adaptability of the new transmitter to the solving of his present pressing problems of interference, etc. In addition to this, the system opens up a new field of investigation and individual progress, it being well known that the spark transmitter has been resolved down to pretty definite quantities, especially within the 200-meter limit, and the arc system is, of course, out of the question for short wave work.

Being based on the all-accomplishing vacuum tube as the generator of oscillations, it lends itself to ease of construction and operation by the use of high-voltage alternating current. The schematic diagram shown in Figure 1 will be easily understood by anyone familiar with vacuum-tube circuits. The transformer, used on the ordinary lighting circuit, eliminates all filament storage batteries and expensive motor-generator installations, besides delivering the usual high power efficiency and absolute dependability of such equipment.

The present undeveloped stage of this apparatus makes it desirable that the experimenter confine himself to a rather low power-range, and increasing same to substitute his present equipment as he becomes more familiar with the new problems involved. In this article, therefore, the writer will describe a novel "buzzer" set, operating on the Spark-Tube principle, small in cost and power consumption, yet showing in operation a range of transmission equal to many spark power-sets of many times its size. To furnish the high-voltage plate current an ordinary spark coil will be used, with the secondary wound to the current-voltage requirements of the particular type of vacuum tube used. In this case the standard V. T. will be considered, and the coil constructed as follows:

Core: Laminated. $\frac{5}{8}$ inches diameter. 5 inches long:

Primary: Two layers No. 16 DCC magnet wire.

Secondary: Four pancakes, each $\frac{1}{2}$ inch thick, 800 turns each of No. 32 DCC or DSC magnet wire.

If the builder is inexperienced in the construction of spark coils he can consult any of the number of wireless manuals on the market which cover the subject quite a good deal better than could be done in the small space available here.

In this coil, however, the insulation of the secondary need not be such an item of consideration as in the usual radio coil, as the voltage generated will not be over 1,000 volts.

The vibrator can be constructed as desired, but a better way would be to obtain a regular Ford coil vibrator from a supply house. There are also a number of radio companies that put out satisfactory coil vibrators for a very slight expenditure.

In the first model of this set the writer used an old Ford coil complete, rewinding the secondary as described.

For purely experimental purposes the use of a panel for mounting the apparatus is hardly advisable. A better and more flexible arrangement is to mount the units on a dry, shellaced wooden base, about 24x36 inches in size. A smaller base will hold everything, but will be more inconvenient for the use of measuring instruments in tests, etc.

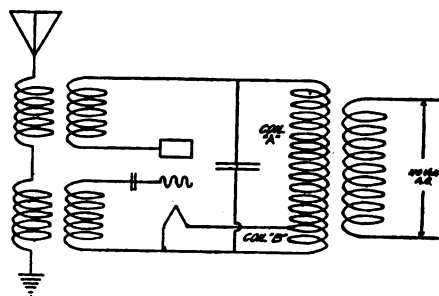


FIGURE 1
Schematic diagram of Spark-Tube Transmitter.

Coil A is the Plate Secondary.
Coil B is the Filament Secondary.

The rest of the units making up the complete set are standard pieces of amateur equipment. The two condensers should be of the .001 M. F. size, variable. The switch (d) in Figure 2 is an ordinary lighting snap switch. Connected as shown, it controls at once the plate and filament circuits, protecting the battery when the set is not in use.

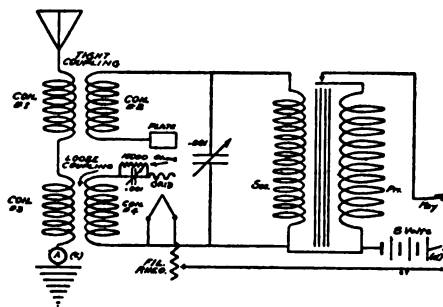


FIGURE 2
Schematic Diagram of Buzzer Spark-Tube Transmitter.

The Tight Coupling Coils should be wound as follows:

Coil No. 1—10 turns No. 22 DCC, 3-inch diameter.

Coil No. 2—10 turns No. 22 DCC, 3½-inch diameter.

Loose Coupling Coils:

Coil No. 3—5 turns No. 22 DCC, 3-inch diameter.

Coil No. 4—5 turns No. 22 DCC, 3½-inch diameter.

Note—In assembling, care should be taken to reverse the storage battery terminals if the set does not function properly. The usual vario-couplers on the market can be used in this circuit.

The only permanent indicating instrument necessary is the antenna-current ammeter (c) in Figure 2. This is to some extent expensive, but a good instrument can be used at every turn in the laboratory. A temporary substitute is a small flash-light bulb placed directly in the circuit. The glowing at full brilliancy of this light will indicate that the set is operating satisfactorily, but it must be remembered that the light itself will

consume a certain amount of power that would be saved by the use of a suitable ammeter.

The following readings were taken from the initial apparatus of this type, but they will vary with the different tubes and coils, grid leaks, etc., used:

Filament current: 0.9 amp.

Coil primary current: 4.2 amp.

Plate current (RMS) 0.022 amp.

Antenna current (200 meters): 0.43 amp.

Effective range transmission: 40 miles.

Coil primary voltage: 8.

Effective plate voltage: 620.

Frequency: About 400 breaks per second.

It will be noticed that, due to the intermittency of the plate voltage, the tube can be worked at about 25 per cent higher power capacity than with the usual DC used in vacuum tube work, without unusual deterioration of the filament.

The principal advantage of the oscillation circuit here used is the absence of a series condenser in the antenna circuit, and the convenience of tuning and adjustment of the plate and grid circuits. The wave length of the oscillations generated is the frequency of the antenna circuit, the other circuits being aperiodic, the inductances in them being used only for coupling them to the antenna circuit.

Tuning the transmitter is done practically the same as the usual Armstrong receiving circuit, adjusting the two couplers until maximum radiation is secured. The grid coupling, as a rule, should be loose and the plate coupling tight.

In future issues the author will describe a home-made arc of $\frac{1}{2}$ K. W. capacity, as well as some naval experiences in the QRM infested and static-splashing Far East.

UNIVERSITY WIRELESS WORKERS ORGANIZED

A Radio Club composed of twenty-five members was formed at the University of Washington at a meeting of men interested in this work. William Watson was elected president of the organization and A. C. Wright, secretary. California, Oregon Agricultural College, Montana and Stanford have wireless stations and receiving outfits.

Space in the electrical engineering laboratory on the campus, for the club and a new equipment will be installed at the expense of the university. Active work on the apparatus is expected to be started by April 1, 1921. As soon as the apparatus is ready, wireless service will be conducted among the various coast colleges in connection with the Pacific Intercollegiate Press Association, of which the University of Washington "Daily" is a member.

Fifteen of the twenty-five members of the club have had practical experience in wireless work, and will arrange to work in shifts to receive scores of all athletic games in the spring and fall.

RADIO CLUB NEWS

SAN FRANCISCO RADIO CLUB STARTS NEW YEAR RIGHT

AMONG the many resolutions made for the year 1921 by the San Francisco Radio Club the following are of interest.

(1) Be it resolved, that every member of the organization do his utmost to secure new members for the organization.

(2) Be it resolved, that a complete radio station be in operation within seven days from the date of this resolution.

(3) Be it resolved, that the San Francisco Radio Club will stand out as the most progressive and efficient organization in the West.

To carry out these resolutions in rapid-fire time, the sum of \$200 was appropriated for the purchase of a complete short wave regenerative and a long wave honeycomb receiver. The radio telephone set is being thoroughly overhauled and a new aerial is being erected on the roof of the Gymnastic Building.

A net profit of over \$400 was declared from the proceeds of the recent wireless show.

Perhaps the most important step taken towards the promotion of the art among the members was the formation of a committee to arrange for the purchase of a large blackboard for use in illustrating new and novel radio hook-ups. One of these hook-ups will be illustrated and explained on every Tuesday evening and a copy of the proceedings will be sent to all club members.

A new membership campaign is now in progress. The dues remain at 50 cents per month, but the initiation fee is lowered from \$2.50 to \$1. No persons under the age of 16 will be admitted to the club. Meetings will hereafter be held on Thursday evenings instead of Tuesday evenings.

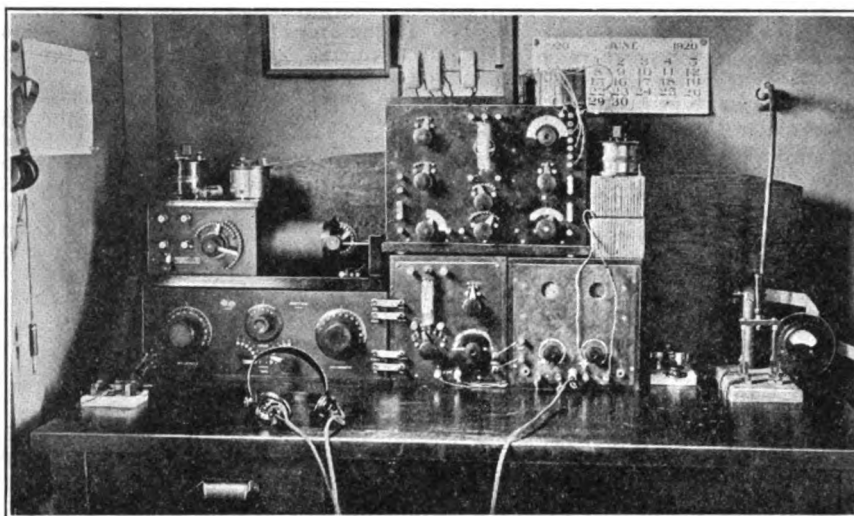
Mr. F. Barry has succeeded Mr. W. J. Henry as secretary. Mr. Henry has accepted a position as radio operator on one of the Panama boats.

All communications should be addressed to the secretary, 2460 Sutter Street, San Francisco.

THE MILWAUKEE AMATEURS' RADIO CLUB

THE Milwaukee Amateurs' Radio Club has started the present radio season with the idea of one big radio club for the city of Milwaukee and has absorbed the Wisconsin Radio League, of which mention was made in "Pacific Radio News" some time ago.

RADIO STATION 8WY



Lord Brothers (8WY), at Cambridge Springs, Pa., are to be highly complimented not only on their station, but on the clever idea of sending the photo shown above to many radio friends in the form of a calendar for the year 1921.

The lucky amateurs who are in receipt of the calendar can use it to ad-

vantage by keeping it constantly before their eyes as an inducement to rival the equipment used by the Lord Bros. and at the same time receive a free correspondence course in neatness applied to a radio set.

No comment on the apparatus used is necessary, as the photo is of such exceptional clearness.

A new meeting place has been secured, through the courtesy of the School of Engineering of Milwaukee. The room is located on the sixth floor of the Old Insurance Building, 373 Broadway. As usual, the regular meetings are held weekly, but on Monday evenings instead of Thursdays, as in the past. The meeting time is 8 p. m.

Of late the meetings have been devoted to discussions on QRM and its mitigation. The membership has arrived at the conclusion that the best thing to do was to adopt the "Chicago Plan" of control of radio traffic. A set of traffic rules and regulations have been worked out and are being enforced by the Committee on Interference and Relay and the A. R. R. L. city manager jointly. An improvement in traffic conditions has been the result.

The club wants every radio amateur in the city of Milwaukee to become a member of the organization and an invitation is hereby given to all parties concerned to attend the next meeting of the club. There are several grades of membership open, making it possible for anyone interested in radio to become a member. The dues are low in comparison to the benefits that are derived by the membership at large.

Two In One, or a saving of 50 per cent, is what the special offer on page 203 means to you.

The EDITOR'S MAIL BAG Our Readers Are Invited to Send Contributions for Publication in this Department.

9LR, T. & H. Radio Co.,
Anthony, Kan., Dec. 29, 1920.

Pacific Radio News,
50 Main St., San Francisco, Cal.
Gentlemen:

I note in a recent issue of the "Pacific Radio News" that 9LR has been entered in the list of calls heard on the Coast, and I don't believe that a list of Western calls that we hear at Anthony will be out of place in your columns. They are as follows:

6AAT, 6EA, 6EN, 6ER, 6JD, 6KA, 6KP, 6JT, 6OT, 6ZA, 6ZM, 6ZH, 6IG, 6GE, 6WV, 6EJ, 7DA, 7CC, 7YS.

Of these, we have worked 6JD, 6KA, 6JT, 6ZH, 6IG, 6GE, 6WV, and have reports of our signals being received by nearly all of the rest.

We can copy the Los Angeles fellows nearly any time after midnight here.

Hoping the above will be of interest, we are,

Very truly yours,
T. & H. RADIO CO.

The amateur call letters, 6BM, were re-issued to Nathaniel R. Morgan, 223 Cowper St., Palo Alto, Cal.

The British Government will erect a powerful station at Hongkong for communicating with Hawaii.

Advance Notice of a Near-Ham

(By Lawrence Mott)

(U. S. Deputy Fish and Game Warden,
Staff Correspondent New York "Sun,"
Sporting Correspondent Los Angeles
"Examiner")

THERE are no two—or three—ways about it! But one answer is there to the query: "To be—or not to be—a ham?"

Answer: to BE!

Hence the great Amateur Organization, for some hundreds o' miles about, will soon hear a new "note" in the night silences. And it will issue from my set, situated at Avalon, Santa Catalina Island, thirty miles out in the Pacific Ocean from the port of San Pedro, near Los Angeles. My call letters will appear in this publication in the next issue, as my sending set is being built to order, and is not quite finished, hence I cannot register its details, etc., and obtain a call and license from my good friend, Major Dillon, in time to catch this number.

But I am usually "listening-in" on short wave lengths from 9 to 10:30 in the evenings, and shall note any messages sent to me from them with whom I look forward to in the near future to having a most delightful dot-and-dash acquaintance.

Just here I give a short list of the further-away amateurs that come in QSA—now:

6AA, 6AB, 6AD, 6AE, 6AH, 6AI, 6AK, 6AN, 6AT, 6BJ, 6BM, 6BQ, 6BR, 6BY, 6AAK, 6CD, 6DK, 6DP, 6EJ, 6GF, 6GI, 6IG (and a lovely "note" he has, too!), 6IJ, 6JJ, 6JM, 6KT, 6LM, 6MK, 6OT, 6SK, 6RT, 6RP, 6PK, 6TC, 6XZ, 6XD, 6UZ, 6WX, 6WE, 6UZ, 6UM, 6PK, 6PQ, 6WV, 6SL, 6TC, 6PR, 7AC, 7BQ, 7CU, 7DA, 7IE, 7ZJ.

Not at all a bad showing—considering that I have not got things really installed, as yet! Then I also get—QSA, WAG, VAG, VAE, VAJ, VAK, WWA, USF, WTB—and twice I have "got" NPM! Of course I hear NPG at any time, and I amuse me'sel', readin' his Honolulu press "dope" each night.

As it may interest prospective friends o' mine—within future reach—I briefly describe my apparatus—as it now stands. There will be some slight modifications when I install the transmitter.

A complete short wave, Grebe, regenerative receiver, with 2-step amplifier, and an exceedingly good detector-in-case that was made by a firm in San Francisco, whose name I have mislaid, but who will recognize my name, and realize my friendly intents to speak well of their apparatus! It uses an Audiotron tube, and is bully.

Then I use Baldwin 'phones. My aerial consists in two spare, 70 feet and 35 feet, with four No. 14 soft-drawn copper wires. For my long-wave reception I use 280 feet of the same kind of wire. I shall increase this length, however, although I have been doing fairly well as it is.

The transmitter will consist of a vacuum tube set, using power bulbs to generate undamped waves, so arranged as to be able to use two or more bulbs, as required, and modulated by a buzzer for telegraphic work. The bulbs will be of the "hardest" kind I can get, and

(Continued on page 231)

SIXTH DISTRICT AMATEUR STATIONS—Continued.

CALL	NAME	ADDRESS	TOWN
6AHN	F. A. Seegert.....	423 West Islay Street.....	Santa Barbara, Calif.
6AHO	Geo. F. Coe.....	Route D, Box 114.....	Lodi, Calif.
6AHP	Willie Williams.....	711 North Gordon Street.....	Pomona, Calif.
6AHQ	R. A. Phillips.....	.....	Moneta, Calif.
6AHR	S. Winters	659 Clayton Street.....	San Francisco, Calif.
6AHS	H. Iams	4460 Georgia Street.....	San Diego, Calif.
6AHT	W. Scammell	1033 Excelsior Avenue.....	Alameda, Calif.
6AHU	R. W. Goodale.....	703 So. Los Angeles Street.....	Los Angeles, Calif.
6AHV	R. Kreyser	805 North Gordon Street.....	Pomona, Calif.
6AHW	C. H. Parker.....	398 Molino Avenue.....	Long Beach, Calif.
6AHX	J. Dering	130 North Aurora Street.....	Stockton, Calif.
6AHY	R. Hall	1721 Beverly Place.....	Berkeley, Calif.
6AHZ	J. Anastasi	Fountain Street	Monterey, Calif.
6AIA	G. W. Till.....	1129 Bella Vista Ave.....	Oakland, Cal.
6AIB	Chas. E. Taylor.....	1620 Appleton St.....	Long Beach, Cal.
6AIC	F. E. Gilbert.....	4021 S. Harvard Blvd.....	Los Angeles, Cal.
6AID	M. L. Bruener.....	763 Humboldt St.....	Santa Rosa, Cal.
6AIE	D. Culbert.....	12 Upper Lowell St.....	Lowell, Ariz.
6AIF	Lindley Winsor.....	200 22nd St.....	Bakersfield, Cal.
6AIG	R. A. Moody.....	707A Santa Clara St.....	Ventura, Cal.
6AIH	R. W. Koch.....	3324 East 14th St.....	Oakland, Cal.
6AII	L. B. Hutchins.....	5 West State St.....	Redlands, Cal.
6AIJ	W. Moore.....	130 East 36th St.....	Pasadena, Cal.
6AIK	B. Wentworth.....	R. F. D. 3, Mission Canyon.....	Santa Barbara, Cal.
6AIL	Thos. M. Sides.....	1333 East Ave.....	Selma, Cal.
6AIM	B. H. Caseboldt.....	Route A, Box 93.....	Escalon, Cal.
6AIN	J. Pasavento.....	804 "P" St.....	Sacramento, Cal.
6AIO	J. Kremer.....	403 East B St.....	Ontario, Cal.
6AIP	R. H. Rodgers.....	4143 Pacific Ave.....	San Diego, Cal.
6AIQ	W. McManus.....	335 Vine St.....	Glendale, Cal.
6AIR	U. J. Barbel.....	.....	Metcalf, Ariz.
6AIS	L. J. Keller.....	1260 Jefferson St.....	Santa Clara, Cal.
6AIT	J. C. Flagg.....	210 East 10th St.....	Claremont, Cal.
6AIU	A. W. Rowe.....	5131 Monte Vista St.....	Los Angeles, Cal.
6AIV	G. George	R. F. D. 1.....	Santa Barbara, Cal.
6AIW	G. E. Robinson.....	512½ Main St.....	Roseville, Cal.
6AIX	D. W. Pabst.....	.....	Sisson, Cal.
6AIZ	L. B. Kennedy.....	Letterman Hosp., Presidio.....	San Francisco, Cal.
6AJA	C. Simpkins	215 Jefferson St.....	Napa, Cal.
6AJB	J. Kaufman.....	803 West Oak St.....	Stockton, Cal.
6AJC	D. L. Hersh.....	1031 South Manhattan Place.....	Los Angeles, Cal.
6AJD	L. Hewett.....	135 West Willow St.....	Stockton, Cal.
6AJE	C. D. Elfving.....	334 McHenry Ave.....	Modesto, Cal.
6AJF	Frank E. Jones.....	1822 Hearst Ave.....	Berkeley, Cal.
6AJG	J. H. Doig.....	2133 Columbia St.....	San Diego, Cal.
6AJH	L. Picker.....	.....	San Ysidro, Cal.
6AJI	W. S. Terriberry.....	676 Apgar St.....	Oakland, Cal.
6AJJ	H. C. McQuarrie.....	1115 Taylor St.....	San Francisco, Cal.
6AJK	H. C. Crabtree.....	660 West Hadley St.....	Whittier, Cal.
6AJL	G. Bergstrom.....	616 30th St.....	Ogden, Utah.

PACIFIC COAST RADIO COMPASS STATIONS

The following listed U. S. Naval Radio Compass Stations on the Pacific Coast are either in full commission or will be in full 24-hour daily commission, as follows:

Station—	Call Letters	Latitude	Longitude	Official Commissioning Date
Eureka, Calif.	NPW	40-41-47	124-16-29	Nov. 1, 1920
Point Reyes, Calif.	NLG	38-02-31	122-59-30	Sept. 15, 1920
Bird Island, Calif.	NLD	37-49-24	122-32-14	Sept. 15, 1920
Point Montara, Calif.	NLH	37-32-12	122-31-14	Sept. 15, 1920
Farrallon Islands, Calif.	NPI	37-42-00	123-00-00	Sept. 15, 1920
Point Arguello, Calif.	NPK	34-34-35	120-38-48	Dec. 15, 1920
Point Hueneme, Calif.	NMD	34-08-40	119-12-30	Jan. 1, 1921
Point Fermin, Calif.	NPX	33-42-19	118-17-37	Jan. 1, 1921
Avalon, Calif.	NZL	33-20-39	118-18-57	March 1, 1921
Point Loma, Calif.	NPL	32-42-30	117-15-20	Feb. 1, 1921
Imperial Beach, Calif.	NPL	32-35-14	117-07-55	Feb. 1, 1921

CALLS HEARD BY WESTERN AMATEURS

CALLS HEARD BY 6EA (Additional)

Heard: 5ZJ, 6AAK, 6DY, 6GE, 6NH, 6OO, 6PE, 6WN, 6ZM, 7GQ, 7YA and 7ZJ.

Worked: 5ZA, 6AAW, 6ACA, 6FX, 6GO, 6IG, 6KL, 6OC, 6OT, 6PR, 6UM, 6ZH and 7DA.

P. S.—My "sigs" were reported heard

by 9WU (Ellendale, N. D.) on December 3rd.

HEARD BY 6EB

(5ZA), (6AAJ), 6AAK, 6AI, 6FH, 6FJ, 6GY, (6IC), 6IY-cw, (6KM), (6OT), 6UO, 6ZM, 7YA, (7ZI).

Anyone hearing 6EB please write.

CALLS HEARD AT 6FZ (Berkeley, Cal.)

6AK, 6BQ, 6CV, 6DK, 6DP, 6EA, 6EJ, 6EN, 6ER, 6FE, 6FS, 6GN, 6GR, 6GY, 6HY, 6IB, 6IF, 6IL, 6JD, 6JM, 6KA, 6GI, 6KP, 6KQ, 6MA, 6MK, 6OH, 6PQ, 6SK, 6TU, 6UM, 6UO, 6XZ, 6AAB, 6AAT, 6AFU, 6AFY, 6AGP, 7CW, 7CU, 7GQ, 7IN, 7ZI.

STATIONS HEARD AT 6OL

6AE, 6AH, 6AJ, 6AK, 6AN, 6BJ, 6BQ, 6CO, 6CP, 6CV, (6DK), 6DP, (6EJ), 6EP, 6FE, 6FS, 6FX, 6GF, 6GN, 6IC, 6IG, 6JI, 6JN, 6JR, 6KM, 6LE, 6NE, 6OC, 6OH, 6PJ, 6PR, 6QM, (6SK), 6UM, 6XZ, 6ZA, 6ZB (day), 6ZE, 6ZH, 6ZK, 6AAK, 6AAT, 6AFY.

CALLS HEARD AT 6AS (San Francisco)

(6AK), 6ACA, 6BH, 6BQ, 6DP, 6EA, (6EJ), 6ER, 6FH, 6GI, (6IY), 6JM, 6JD, 6KA, 6KP, 6MK, 6OH, 6PE, (6QR), (6TU), (6IC), 6XZ, 6OT, 6ZA, 6ZN, (7DA), 7BQ, 7IN, 7ZI, (7ZJ). 7ZJ was heard without antenna or ground, using two-step amplifier. Signals strong. Stations in parenthesis were worked on ½ K. W. transformer.

Station 6GF is located at 2318 Eye Street, Sacramento, Cal., instead of 3347 U Street, as previously published. The owner of station 6AGU in Oakland, Cal., is Mr. Lew Torrey. His name was listed as Toney in the call directory.

Station 6XM is now located at 507 Ulloa Street, San Francisco. The following calls are reported heard: 6AJ, 6AK, 6AV, 6AY, 6BQ, 6CK, 6CM, 6CQ, 6OV, 6DH, 6DP, 6EA, 6EJ, 6ER, 6FE, 6FS, 6FV, 6GF, 6GI, 6HB, (6IYC-w), 6IZ, 6JD, 6JI, 6JM, 6JQ, 6KA, 6KP, 6OH, 6OY, 6PE, 6PR, 6QK, 6QM, 6QR, 6SK, 6TC, 6ZA, 6AAM, 6AAT, 6ACA, 6ACU, 6AGF, 6ABP, 7CC, 7ZI, 7ZJ.

STATIONS HEARD AT 6GF (Sacramento, Cal.)

6AAM, 6AAW, 6AAJ, 6AFM, 6ADU, 6AE, 6AGF, 6AGP, (6ACA), 6ABP, (6AH), (6AJ), 6AN, 6AR, (6AS), 6AT, 6BAA, 6BJ, 6BP, 6BQ, (6CO), 6CP, 6CQ, 6DH, (6DK), (6DP), (6DY), 6EA, (6EB), 6EL, (6EN), 6EP, 6ER, 6EX, (6FE), (6FI), 6GE, 6GI, 6GK, 6GQ, 6HH, 6HP, (6HY), 6IF, 6IG, (6IL), 6IT, 6IU, 6IV, 6IY, 6JD, 6JI, 6JJ, 6JN, 6JQ, (6JR), (6KA), (6KM), (6KP), (6KQ), 6LT, 6MN, 6NE, 6NH, 6NO, 6NY, 6OC, 6OH, 6OT, 6OY, 6PE, 6PJ, (6PQ), (6PR), (6QM), 6QR, (6SK), 6ST, (6TC), 6TX, 6VL, (6XZ), 6ZA, 6ZB, 6ZE, 6ZH, 6ZK, 6ZL, 6ZM, (6ZN), 7AD, (7BP), 7BQ, 7BR, 7BS, (7BV), 7CC, 7CR, (7CU), (7CW), 7DA, 7DG, 7FH, (7GQ), (7GY), 7HE, 7IM, (7IN), 7ZB, (7ZI), 7ZK, (7ZJ), 5ZA, 9LR.

The Chicago Radio Laboratory Announce

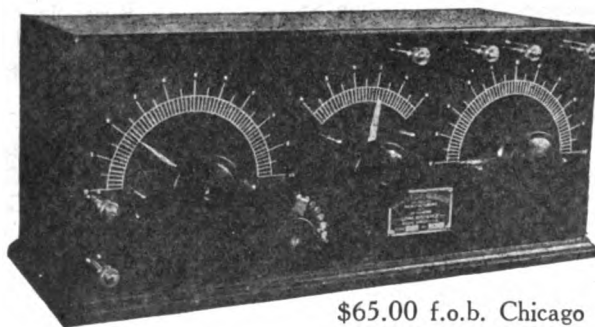
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A BUNGLED AFFAIR

(Continued from page 209)

"Well, it won't do him much good, anyway, as long as you happen to be on board," rejoined Peter Bockstrup. "You can arrest him yourself."

Collinge did not immediately answer. He stood silent and seemed to be turning this suggestion over in his mind.

"Yes, I suppose I'll have to arrest him myself," he said, at last, with evident reluctance. "I'm out on an important case—a thousand times more important than any mere jewelry theft, and I don't wish to be mixed up in this thing. He could easily be picked up in San Francisco, but then he knows I'm on board and he'll likely hide the stuff or throw it overboard to save himself. However, I had rather merely declare him under arrest and then turn him over to your captain. He can deliver the prisoner to the police when we arrive, and that will leave me out of it."

The chief wireless operator took Collinge to the captain's cabin and the skipper was made acquainted with the situation. Captain Jensen became greatly excited as he listened to Collinge's talk.

"Yumpin' yiminy!" he exclaimed, rising from his chair. "Ve shall go right away an' lock him up in the fo'c'sle."

The three hastened down to the suspected passengers stateroom and found him laying in his bunk, with all his clothes on, groaning with real or pretended seasickness.

"You—!" he screamed, catching sight of Collinge. Half-arising, he quickly plunged his right hand into his coat pocket. Before he could withdraw it, however, Collinge had seized his wrist in an iron grip.

"Keep quiet, Jack Lambert," he grated, in a steely tone, drawing a big automatic from his own coat pocket and sticking it in the small man's face. Releasing the other's wrist, Collinge produced a pair of bracelets.

The captive shrank back against the wall of his bunk.

"Damn you—!" he began, again, and then choked off his speech with a gurgle, as Collinge leveled his automatic at the small man's head and stiffened a finger upon the trigger.

"Shut up and behave or you're a dead one!" ominously threatened Collinge, snapping the bracelets on the prisoner's wrists. "I'm taking no chances with you—not any!"

Collinge began to search the prisoner. From one pocket he withdrew an automatic, quite similar to his own; from another skilfully concealed hiding place he took a tiny, but deadly derringer.

"Yumpin' yiminy, he bane vun bad feller, eh!" muttered Captain Jensen.

"Now let's see the swag," said Collinge, pulling the prisoner's black satchel out from under a pillow. The bag was locked and Collinge searched the captive again, in an effort to find a key. He did not find it, but he did come upon a pocket knife, which interested him.

"This is what he cut the aerial hal-yards away with," stated Collinge, briefly, as he opened the knife and examined it. Peter Bockstrup and Captain Jensen looked at it also and they saw that the knife was wet and that a few fibres of manila were adhering to the blade.

The captive's small eyes glittered with rage, but he said nothing.

Collinge neatly slit the bottom of the satchel with the knife. Inside was a single parcel. Cutting the string on it,

Collinge removed several paper wrappings and brought to view an elegant jewelry case. He pressed the catch and the case flew open, revealing a magnificent necklace of large, perfectly matched and almost blue-white diamonds.

"Whew! The Ellingsworth necklace!" murmured Collinge, lifting a part of the thing on his finger and watching it flash and sparkle. "It's worth a hundred and fifty thousand dollars, if it's worth a penny! We've surely caught Lone Lambert with the goods on him, this time!"

The captive's face was ashen and drops of perspiration stood out on his forehead. He was roughly laid hold of and dragged forward through the rain and spray to the forecabin. Here he was pitched into the paint locker, which was the only available place for him. After securing the door with two big brass padlocks, Captain Jensen called a big Finn sailor and ordered him to get a piece of timber and stand guard over the prisoner.

"If he bane get fresh and tries to run away, chust bust him in the head with the stick," the sailor was instructed. "I skall have the mate take two other fellers to stand watches by you, so he von't have no chances to get away, by golly!" With this, Captain Jensen led the way aft.

"I skall take care of the necklice?" he queried, when they had reached his cabin. "It vere better inside my safe."

"Yes, you had better put it in your safe," rejoined Collinge, promptly. "I'm carrying some valuable stones myself, and you can keep them all together." As he spoke he drew a large, bulging wallet from his inner coat pocket. From it he took a small wad of tissue paper, which he opened, bringing to view a scintillating, remarkable looking brooch and a number of large unmounted stones. Placing the flat necklace case with the jewels, Collinge carefully wrapped it with the tissue paper, placed the package in the wallet and handed it to Captain Jensen.

"That's a fine pockethook to have now, by golly!" remarked the skipper, as he placed the wallet in the safe and carefully locked the door.

For four days and nights the storm raged, unabated. The little steam-schooner pitched and rolled without a moment's cessation, but, nevertheless, managed to keep making about five knots. During all this time Collinge kept an eye on the prisoner in the paint locker, brought him his food and allowed no one to get near him.

On the morning of the fifth day the "Yosemite" was abeam of Point Reyes. There, the weather suddenly began to improve. As soon as the wind had moderated somewhat Peter Bockstrup had the sailors string a short piece of aerial wire, which he had found among his spare gear. Having no insulators, he suspended the wire with pieces of fresh, dry rope. As soon as the temporary aerial had been arranged, the chief wireless operator tightened coupling of his transmitter and called up NPG.

"W-Q-Y," the San Francisco naval radio station came back, immediately. "Everybody been trying to raise you last four days with rush message ordering arrest and giving full description of crook called Lone Lambert reported aboard your ship—did you copy it?"

(Continued on page 223)

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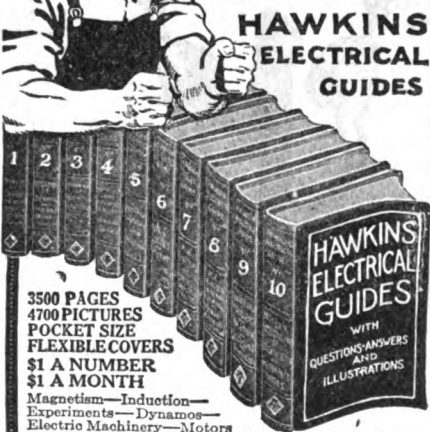
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VARIOMETERS

(Continued from page 207)

suffice to insulate one end of the rod from the other. The connections should all be soldered. One point to remember in doing all soldering is this: be sure the metals you wish to be soldered are heated to the melting point of the solder, otherwise you will not have a perfect connection.

The rotors may be given a coat of shelac before winding, and shellac should be applied as often as necessary to insure it being wet as the wire comes on. Thick shellac should be used; if it is too thin it is useless.

The stator forms are next in line to be made. Figure 2 shows the stator form. It is made in halves in order that the variometer may be assembled. The four halves are turned on a face-plate on the lathe. To start, drill a hole, about $\frac{3}{8}$ inch to $\frac{1}{2}$ inches at the exact center of the square wood block for the stator form and four holes at the four corners in a place where these holes will not interfere with the hole to be turned in the center. The center hole is for a long screw, about $1\frac{1}{2}$ inches to $1\frac{3}{4}$ inches long to locate the wood on the face-plate in exact center and also to hold the little piece that would otherwise drop out in turning the hole out. After the exact center of the wood on the face-plate has been determined, the maple block is screwed on and four screws screwed in through the corner holes. This will securely hold the block in turning, provided too heavy a cut is not taken. First turn the center of the block out and remove the center by removing the center screw. The turning may be then started to fit the template, shown in Figure 2 A. Dimension J is $\frac{1}{2}$ inch and I is $2\frac{3}{8}$ inches. If the builder thinks he can build this variometer with a closer coupling, if accurate workmanship is done, this radius may be lessened, but with a $2\frac{3}{8}$ inch radius the variometer will be efficient and will not require extremely accurate workmanship.

After four stator form halves are turned out, the form for the wire to go into the stator is to be made. The complete form is shown in Figure 4 and the template for turning it out is shown in Figure 4 A. In either figure, Dimension G is $1\frac{1}{4}$ inches, J is $\frac{1}{2}$ inch and radius L should be the same as radius I minus the diameter of the wire to be used. It can be made $2\frac{3}{8}$ inches minus $\frac{1}{8}$ inch, or $2\frac{1}{2}$ inches, $\frac{1}{8}$ inch being the diameter of No. 18 D. C. C. wire. The same form can be used to wind the two grid stator coils with No. 22 D. C. C. wire because it is smaller in diameter and the coil will fit the form a little loosely, but this can be filled with shellac. Referring to Fig-



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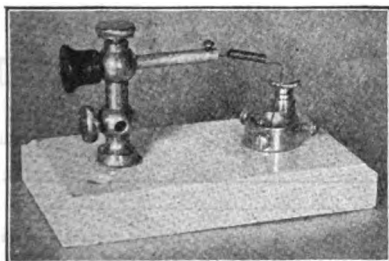
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ure 4, a wooden plug is turned out which will fit the main winding form. This is to provide a starting flange for the coil to prevent it slipping off the form. The form may be made of any kind of wood since it is only used for winding purposes. Drive two small brads, one in the main form and the other in the plug, as shown in Figure 4. These brads will be used to tie the wire at the ends of the coil.

If a closer fit is desired in the No. 22 wire coils, the form may be turned with Dimension L 2 1/2 inches. This will insure a tight fit. The No. 22 coils are then wound first, the form afterwards turned down 1/4 inch in radius, and then the No. 18 coils wound.

The wire is wound by first tying it, with sufficient amount extra for a lead, to the nail on the plug, and then winding it, with considerable tension on the wire, on the form until it runs up to, and three or four turns over, the line indicating the width of the coil; G, in Figure 4. In winding the coil, or any coil, in fact, the wire should always be wound so that it is passed over and under two or three fingers. This is to bend the wire back and forth so that it automatically straightens itself as it winds on the form. Cloth should be used to protect the fingers from wearing and heat. Several thicknesses of cloth are usually necessary. When the coil is wound it should be given three coats of shellac on the outside. The inside of this coil must, of course, not be shellaced while winding, in order that it can be easily removed from the form. The outside coats of shellac should be applied with a day's time between the first coat, and several hours between the second and last coats. The coil is then ready to remove. In winding these coils it must be observed the direction in which they are wound so that a continuous coil, wound in the same direction, will be the result.

Figure 5 shows how this is done. The wooden plug is removed from the main part of the form after the wire has been unfastened from the brad on the plug. The form is then placed in a vise, as Figure 5 shows, and with a piece of hardwood or fibre, is lightly tapped off. The operation of removing these coils from the form requires patience or failure will result. The coil should not be tapped off, or out, more than 1/4 inch in one place without turning the form in the vice again and hammering in another place. By rotating and hammering slowly and carefully all around the coil will come off perfectly. It is then delicate in this thin shell shape and should be carefully handled. Two coils of No. 22 and two of No. 18 are required for two variometers. Figure 3 shows a sectional view of a stator coil.

The coils are placed in the stator forms by first shellacing both the coil (Continued on page 222)

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VARIOMETERS

(Continued from page 221)

and inside of the stator form with thick shellac and pressing the coil carefully into the form before the shellac is dry. Be sure that the shellac is not dry, otherwise the stator coil will not stick properly to the form.

Refer to Figure 6. The bearing block is made of $\frac{3}{8}$ inch or $\frac{1}{4}$ inch brass with Dimension N, 1 inch, and M, 2 inches. The hole in the center must be drilled to allow the shaft to turn easily in it. The four screws which hold the bearing block must be of such length that they will not come through the form and disturb the stator coil. $\frac{3}{4}$ inch round-head brass screws are about the right size. No iron or steel should be used in the construction of the variometer it is to be noted.

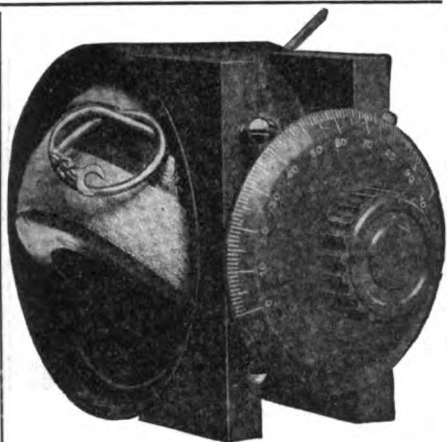
The variometer is now ready for assembling. The outside of the variometer stator halves should be so made, and they will be if instructions are followed, that they will register perfectly when the inside holes are exactly opposite each other. The screw shown in Figure 6 at the edge of the variometer is used to hold the stator halves $\frac{1}{4}$ inch apart. By carefully locating the screw holes for the bearing blocks the rotor will turn without touching the stator coils, and equally distant from them, when the variometer is assembled. The builder should be able to spin the rotor without the rotor touching any part of the stator coil. At first the rotor may work hard, due to the shafts being slightly out of line or because the bearings are not worn in properly. The builder must provide some means of preventing end play. A brass collar with a set screw will accomplish this nicely, between the panel and the bearing block.

In Figure 7 is shown a good hook-up for a regenerative receiver. The primary inductance may have a variable shunted across it to increase its wave lengths or placed in series with the antenna to shorten the received wave lengths. V_1 is the variometer wound with No. 22 wire and V_2 is the one wound with No. 18 wire. As shown in the figure, the coils of the variometer are connected in series.

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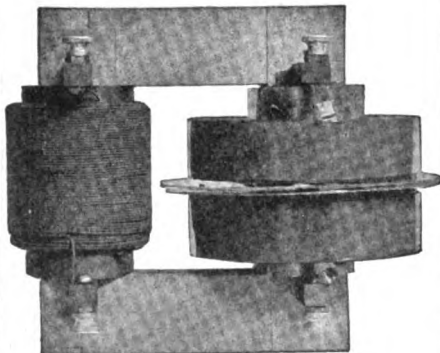


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"B" Batteries

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Guaranteed 45 volts
Six Taps

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We also build any type of set to
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Wireless Engineers

10 Mission Street, San Francisco

New 1921 Reduced Prices!

Type CSU balanced variable condenser Bakelite insulated, with $\frac{1}{2}$ " silver plated Navy dial indicator.

.0006 mfd. \$6.00. .0011 mfd. \$6.50
Postage paid.

Sorala split-secondary modulation transformer \$6.00 postpaid.

6" threaded Bakelite tube for VT transmitting inductance \$3.50 postpaid.

While made to sell at a higher price we are taking a narrow margin on

TYPE J AMMETERS AND MILLIAMMETERS, postpaid. 0-3 Amps. \$7.00; 0-5 Amps. \$7.00; 0-100, M.A. \$7.00; 0-300 M.A., \$7.00; 0-500 M.A., \$7.00.

By consulting our 1921 Bulletins, sent for 4c, you can build a phone at a reasonable price and be satisfied.

SOMERVILLE RADIO LABORATORY

SOMERVILLE RADIO LABORATORY
102 Heath St., Somerville, 45, Mass.

A BUNGLED AFFAIR

(Continued from page 219)

"N-P-G, de W-Q-Y," pounded Peter Bockstrup. "No, didn't get message, but we got crook safe—he cut aerial away first day out—couldn't fix it account no spares and bad storm—here's radio—Yosemite ck 14 dh rush Police S. F.—Have Lone Lambert prisoner will dock Meiggs wharf ten A. M.—Captain Jensen—"

Just as Peter Bockstrup was finishing off, he saw his aerial ammeter suddenly drop down to zero. Looking outside, the chief wireless operator saw that the rope insulator farthest from the lead-in evidently had been burned off by leaking current at the point where the wire joined the rope, with the result that the forward end of the improvised aerial had fallen to the deck and grounded.

As the ship was almost in port, and as he could see no particular necessity for getting the message describing Lone Lambert and ordering his arrest, when the criminal was already held captive, Peter Bockstrup decided not to try to do anything more with the aerial. Instead, he set about changing into his "shore clothes."

An hour and a half later, the "Yosemite" slowly worked her way alongside at Pier 41. Surrounded by a large crowd of curious spectators, were two plain-clothes men and half a dozen policemen, waiting, with the patrol wagon, on the pier. Farther up the landing, near the street, a big, speedy-looking grey car backed up unobtrusively behind a pile of lumber and waited.

The ship had hardly been made fast when the detectives and policemen scrambled aboard.

"Where is he?" they demanded in a chorus, as they came up on the upper deck, where Captain Jensen and the chief wireless operator awaited them.

"Come right this way, gentlemen," said the skipper, proudly, leading the way. "He bane locked up forrard in the paint-locker."

Reaching the fore-castle, the policemen all drew their revolvers and stood watchfully waiting as the skipper unlocked the door of the paint locker and threw it open.

"Hell!" burst out one of the plain-clothes men, upon seeing who was inside. "That's only Jack Evans, one of De Lacey's special messengers!"

"But the deteketive said he bane vun Lonely Lambert feller!" spluttered the skipper, sensing, even in spite of his thick-headedness, that something was very much wrong.

"What deteketive?" demanded the plain-clothes man.

"It was Lone Lambert himself," interposed the messenger, glumly, as he stepped out of the paint locker. "He played one of his old favorite games again—flashed a fake Pinkerton badge and a pair of bracelets. When he took my gats he slipped a jack-knife in my pocket, and then pulled it out again, a minute later, so as to make it look as if I was the one who had cut down their wireless aerial. You know, Lone Lambert's bait is good enough to fool even smart fish, and as for these two simple-brained suckers—they just swallowed the hook, line, sinker, and all! That's all there is to it."

"But, why—?" began the plain-clothes man.

"Oh, I couldn't do a damned thing," interrupted the messenger, shortly, knowing what the detective was going to say. "He kept a big automatic in my face

(Continued on page 229)

Wesrad Mail Order Service

"Everything in Radio"

Prompt Delivery---
Courteous Service

Send for Our Latest

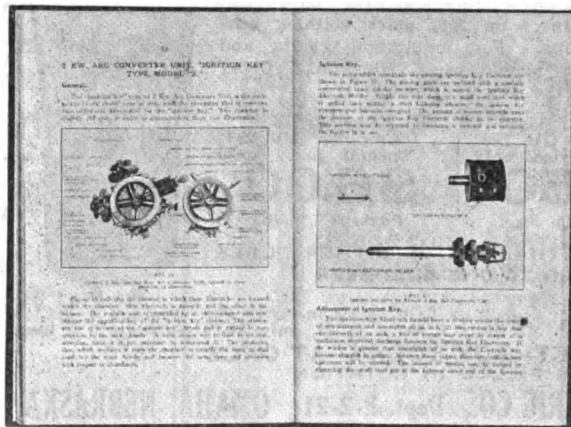
Stock Bulletin and Price List

Western Radio Electric Company

550 SOUTH FLOWER ST.

LOS ANGELES, CALIF.

A GOLD MINE OF INFORMATION ON THE FEDERAL ARC



THE ONLY
BOOK OF ITS
KIND ON THE
MARKET.

COMPILED
BY THE
ENGINEERS
OF THE
FEDERAL
TEL. CO.

NOTE THE ILLUSTRATION. This is a specimen of the method used by the Federal Engineers to illustrate and explain the operation of

the modern radio arc. The book thoroughly covers the operation and care of the 2 K.W. and 5 K.W. installations for ship and shore stations. Many circuit diagrams and elementary principles are treated precisely. A large map of various arc stations in operation throughout the world is included in this book. Every radio student should have a copy.

Contains 37 illustrations and half-tones of the various arc systems. Heavily bound and ready for immediate delivery. It is of as much value to the amateur as to the commercial man. Many vessels operated by the U. S. Shipping Board are equipped with the Federal Arc. This is your opportunity to acquaint yourself with the latest radio systems. Arc operators are given preference by many radio service companies. You are not a full-fledged operator if you do not understand the arc.

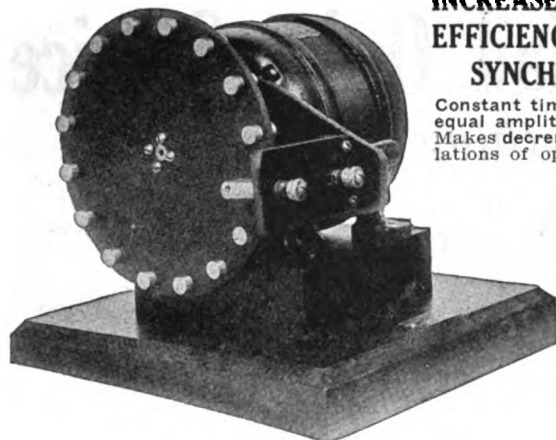
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Constant time interval between discharges of equal amplitude. Clear clean cut spark tone. Makes decrement extremely low. Keeps oscillations of open circuit out of closed circuit. Puts the current where it belongs, in the antenna. Motor follows every voltage variation obtaining the maximum condenser discharge. Total length of conductors in gap less than 3 inches, permitting the use of a larger condenser. Adjustable stationary electrodes, large discharge surfaces, Bakelite-Di-lecto Grade XX used throughout. Quiet running. Motor of single phase SYNCHRONOUS type, 1/8 H. P. 110 volt, 60 cycle. Net wt. 35 lbs. F. O. B. CHICAGO \$85.00.

RAY-DI-CO. 2653c N. Clark Street **CHICAGO**
Specializing in the designing and construction of Radio Phones to your specifications.

ARC RADIO APPARATUS

(Continued from page 213)

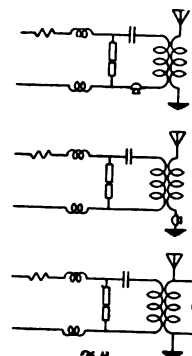


Fig. 13 shows various arc radiophone hookups. Many more combinations and arrangements are possible, but these are the more common ones.

Jennings B. Dow.

(The End)

RUB YOUR EYES AGAIN!

TALK ABOUT SALE—HERE'S A GOOD ONE

(By special popular request we are extending this record-breaking sale 30 days more. If you missed out in the opportunities in our ad. in the Jan. "P.R.N." here's your chance now.)

And the reason for the sale? Well it's this. The C and S Catalog is ready. We need your address to send you a catalog. So we figured that by offering these remarkably low prices, you will grasp the opportunity and order some apparatus. Thus, we will secure your address and send you a catalog. So, in this ad we are offering superlative apparatus selling at EXTREMELY LOW PRICES.



GENUINE RADIOTRONS

Those ultra super-sensitive detector and amplifier bulbs. Absolutely the best bulbs sold. Detector operates on 22½ plate voltage; amplifier 45 volts. For maximum results and efficiency you should use "radiotrons." Order today—while the price is low!

Regular \$5.00
Detector UV 200
Special price only
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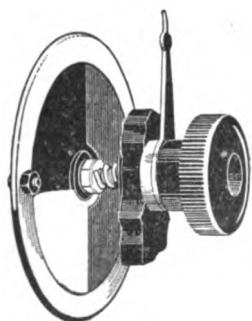
Regular \$6.50
Amplifier UV 201
Special price only
\$6.00
Postage 1 lb.

NOT MORE THAN SIX OF EITHER TUBES
SOLD TO ONE CUSTOMER



BAKELITE PANELS 6 in. x 6 in. x 1/8 in. only 89c. Postage 1 lb.
12 in. x 6 in. x 1/8 in. only \$1.77. Postage 1 1/2 lbs.
SAVE MONEY—BUY TODAY—AT ONCE
ORDERS FILLED IN ROTATION

THE C and S RADIO ELECTRIC CO., Dept. P-2-21 OMAHA, NEBRASKA



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16

Dealers: Write for discounts

PARKIN MFG. CO.,

San Rafael, Calif.

A 15-mile Radiophone

Out of a large stock of genuine double filament, double life, Audio Trons, we have carefully selected and tested a limited number of tubes which are especially adapted to be incorporated in Mr. H. D. Selva's 15 mile radiophone operating on "B" batteries.

His circuit, together with directions for assembling, advertised elsewhere in this magazine, has been thoroughly tried and proven by a large number of amateurs who are now talking over remarkable distances.

We are offering you an excellent bargain by cutting the price of these specially selected genuine double filament Audio Trons from \$6 to \$5 each.

Results are positively guaranteed when our tubes are used in connection with Mr. H. Selva's radiophone circuit. **The Kehler Radio Laboratories**
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Hams—

Why not get in on the long wave stuff?

Use Radisco coils.

Here is a combination that gets fine results for everybody that uses it.

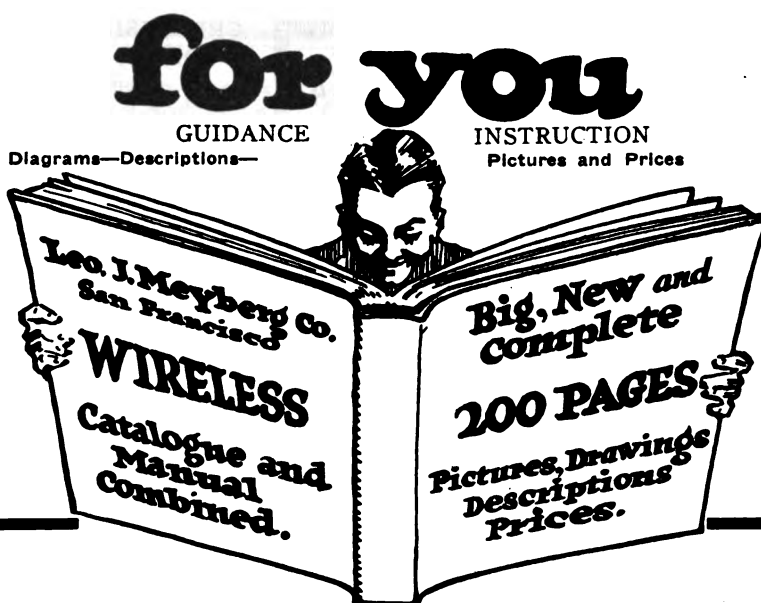
LRD 1200 for Primary
LRD 1200 for Secondary
LRD 550 for Tickler

Special introductory offer

This combination sent anywhere in the U. S., postpaid, for \$3.50. Send your order today. The coils will be shipped immediately, and you can start right in on your long range work.

Kelly and Phillips

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Yes—for YOU, you radio amateurs who live in the great WEST, for you particularly. Because it lists, pictures, and describes the complete radio lines of this big Western supply house from whom you can get every bit of radio apparatus you need—quickly and cheaply, right in your own territory. And select it all from this one big, handy book.

—AND—OH BOY! IT IS SURE SOME BOOK!

Newest, latest, and best radio equipment shown, described, explained, and priced in a single comprehensive volume. You need it as an up-to-date reference book. You need it as a complete catalogue. You need it as an instructive radio manual. You need it as a guide in the selection, purchase, and use of CW and Radiophone equipment. Send 35c in stamps NOW and get your copy by return mail. Don't delay—the supply is limited. The 35c is refunded with your first \$1.50 purchase from us, but must accompany your request for the book. Address—

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Arco Amplifying Transformers.....	\$5.00
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45-volt "B" Batteries.....	5.00
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We reached Portland (150 miles) with our type "O" Radiophone using AC. Why not install one?

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FORMICA

SHEETS - TUBES - RODS

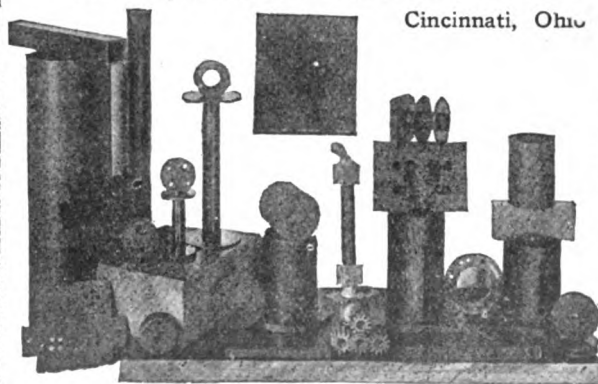
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

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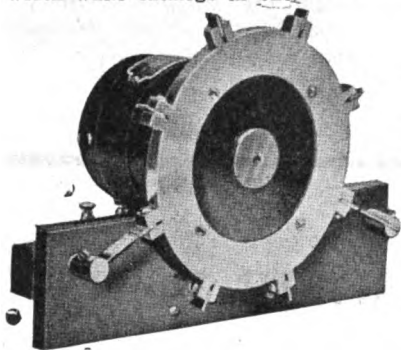


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DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

CRASH!

20% DISCOUNT ON THE FIRST FIVE

!BANG

Order from each city of one or more of our Type V1R complete vacuum tube receiving outfits on genuine Formica "Hi-Grade Special" panel complete with H-C coil mounting, rheostat, grid leak, grid cond., socket, 23 plate var. cond., etc. Connections soldered to lugs under machine screws, covered with insulating tubing. Only \$16 less 20%; without var. cond. \$12 less 20% P. P. Same discount allowed on all types. Stamp for full list. Cash or one-third with order, balance C. O. D.

HI-GRADE WIRELESS INSTR. CO., ASHEVILLE, N. C.

The Best and Most Worth Worthy

course in Radio Telegraphy ever published commences with the February issue of Experimental Science.

Written by one of the foremost radio men in America. Edward T. Jones, Associate Radio Editor Experimental Science Magazine.

Other features: Construction of apparatus; new hook-ups; articles on electricity, chemistry, physics and science in general.

Each issue puts it over on the previous one.

Subscription rate \$1.50

EXPERIMENTAL SCIENCE PUB. CO., Inc.

312-1311 G ST., N.W.

WASHINGTON, D. C.

When writing to Advertisers please mention this Magazine

CRITICISING THE DEPARTMENT OF COMMERCE—UNJUSTLY

(Continued from page 214)

equipment of the ship and it is not necessary to hide them under the bunk or lock them up in some other nook to offset the possibility of having them seen by the "Powers That Be" upon arrival at port.

Experimentation is a mighty good thing, and if a fellow has a bit of ambition and an opportunity which does not conflict with his routine, the use of vacuum tubes even in connection with long wave receiving apparatus is not such a bad plan, but when one man copies press from NSS all the way around the world and gives it to the "Skipper" and the crew, you can easily imagine what the next fellow is up against, when, with the same set and the old crystal detector, he can't copy the weather from NAA more than a few hundred miles. "Skippers," for the most part, know nothing more about radio than to howl for press, weather reports and time signals, and when they don't get them the thought is apparent, if not expressed, that the man with the ear muffs is unskilled in radio. Another angle of the experimentation game is that it is sometimes very costly for the company in control of the radio equipment, as well as a menace to safety of life at sea.

There is a line operating steamships from one of our large ports which has posted instructions in all the radio rooms of its vessels forbidding adding any kind of equipment to the original installation. This ruling was brought about by the fact that one man ruined the secondaries of three different receiving sets. He was using some valve stuff of his own and got some of the wires mixed up, with the result that the secondaries went up in smoke. The bills for the repairs are probably the cause for the order, but in addition to the cost there is a more important consideration: what might be the result, if the ship had been in distress with her receiving set shot to pieces?

This sea-going experimentation generally necessitates various changes in the circuits of the ship's receiving equipment, which in every instance should be put in shape again before leaving the ship in the home port. The reason for this is that none of us know whether or not we will sail on the same vessel again or will even have time to visit the vessel to make the change-over before we go somewhere else. In the meantime, some other man may be assigned to the ship and, not being familiar with the change made to the tuner circuits, will be up against it, especially if he is inexperienced. Work of this kind is going on all the time, and it is up to the man who does it to be sure that he does not cause

(Continued on page 228)

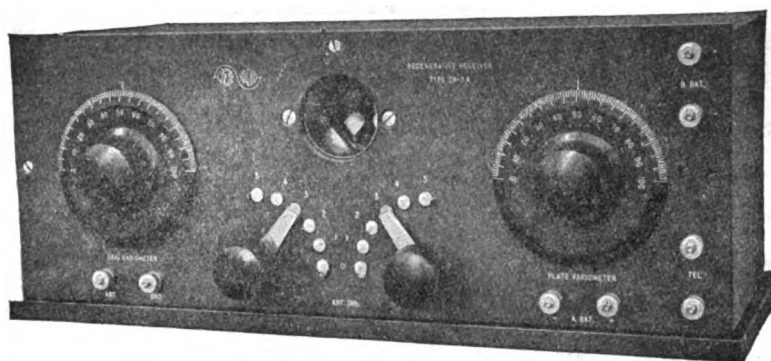
Here's a SURE Winner

For long distance work you can find nothing to beat the



Type CR-3A

Short-Wave Regenerative Receiver
and
Vacuum Tube Unit



Compact, complete, dependable, with a wave-length range running up to 375 meters, it fills the need for a moderate-priced regenerative receiver. Built in every way up to the Grebe standard.

The CR-3A includes a variable antenna circuit, continuously variable grid and plate circuits, a specially designed coupling circuit and a standard vacuum-tube mounting with a grid condenser and leakage element. All binding posts are conveniently located on the front of the panel. The price, \$45.50, is within the reach of all.

Be sure to ask your dealer about the CR-3A.

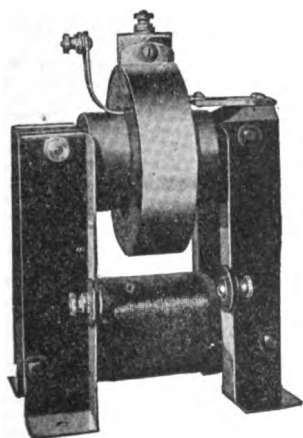
GREBE RADIO apparatus is licensed under the original Armstrong and Marconi patents.

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Thordarson Gold Medal Apparatus



TYPE "RS"
TRANSFORMER

TYPE RS

a non-resonant transformer with a low secondary potential designed to give the highest possible power factor.

1	KVA	15,000 volts.....	\$30.00
1/2	KVA	10,000 volts.....	20.00
1/4	KVA	8,000 volts.....	15.00

TYPE R

Resonant Transformer

1	KVA	25,000 volts.....	40.00
3/4	KVA	10,000 volts.....	28.00
1/2	KVA	10,000 volts.....	22.00
POWER CONDENSER			25.00
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R8 Rotor (8 tooth).....			5.00
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Please specify size of shaft.

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Knobs, Handles
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We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

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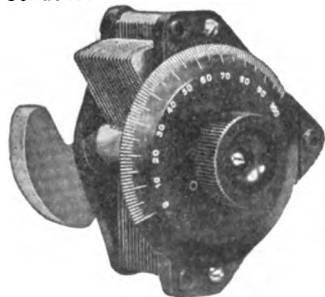
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CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No. 1—.0011 m.f. mounted	\$5.00
No. 2—.0006 m.f. mounted	4.50
No. 3—.0011 m.f. unmounted	4.75
No. 4—.0006 m.f. unmounted	4.25
Bakelite Dials only .....	.75

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET

CHELSEA, MASS.

Manufacturers of Radio Apparatus and Moulders of Bakelite

CRITICISING THE DEPARTMENT OF COMMERCE UNJUSTLY

(Continued from page 226)

his relief a great deal of trouble. Connections which are soldered should not be tampered with unless we have the necessary tools and the necessary knowledge for putting the set in its original condition. Of course, such experimentation, except in special instances, is not looked upon favorably by the owners of the equipment, but that is not going to stop it.

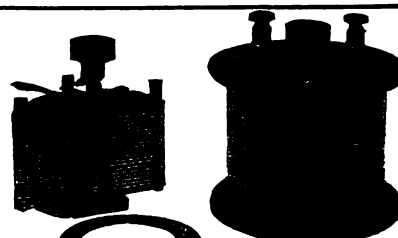
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PACIFIC RADIO NEWS

Pacific Radio Pub. Co.

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THE "ILLINOIS" VARIABLE CONDENSER

The Condenser with "Star Spring" Tension

MADE RIGHT - STAYS RIGHT
Hard Rolled Aluminum Plates

These condensers are made by a watch mechanic, schooled in accurate workmanship and who can't get over the habit of critical inspection.

Three Styles: No. 1, Panel; No. 2 Open Type as shown; No. 3, Fully Encased. Anti-Profitteer. Less than pre-war prices. Fully assembled and tested.

	Style No. 1	No. 2	No. 3
67 Plates	\$7.00	\$	\$
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured P.P.

With Style No. 1, we will, if desired, furnish 3 inch Dial with large knob, instead of Scale and Pointer. Extra Price 75 cents.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

The "ILLINOIS" is rapidly adding to the number of its friends. The bouquets they fling only spur us to still more careful work, and more rigid inspection. It is a matter of pride that among the thousands of instruments sent out, not a single complaint has been received of bad condition. This may possibly be because every instrument is subjected to the scrutiny of the "old man's" eyeglass.

Patent is pending on the "Star Spring" feature, which is very valuable. The action of this spring produces an unvarying friction that holds the "rotor" in any position to which it may be set, and at the same time automatically centers the plates in relation to each other, and prevents and possibility of "endshake."

The plates are in proper relation by construction, and will remain so, obviating any necessity of readjustment. Once right, always right. Once mounted on your panel, there is one thing that you can depend upon to never give you trouble.

We thank our friends for their letters of generous appreciation.

Kindly note: We issue no Catalog, and make no "trade discounts." We set our prices at the lowest limit, and leave the "middle man" out for the sole benefit of the "consumer."

G. F. JOHNSON

625 Black Avenue

Springfield, Ill.

A BUNGLED AFFAIR

(Continued from page 223)

all the time and if I'd said one word he'd shot me dead—you know Lone Lambert!"

"Vait, it's all right, it's all right!" suddenly burst out Captain Jensen, in a tone of vast relief. "The package with the shinys is right in my safe."

The skipper rushed aft to his cabin, followed by the rest of the crowd. Making for his safe, the commander of the "Yosemite" hastily turned the combination, swung the door open and took out the bulging wallet.

"By golly, you see now, I wasn't so foolish that I let das feller keep the necklicel!" he exclaimed, triumphantly, as he removed the package from the wallet. Hurriedly, he tore away the tissue paper—then stopped and stared with an oath of incredulous dismay.

The little package containly only a few small crap dice and an empty neck-lace case!

Out on the pier, the big grey auto sped swiftly away and disappeared into the traffic of the street.

(The End)

343 S. Fremont Ave.,
Los Angeles, Cal., Jan. 2, 1921.

Editor Pacific Radio News,

50 Main St., San Francisco, Cal.

Dear Sir:

Having recently finished my new home-made variometer type regenerative receiver, designed both after the pattern of the "Paragon RA6" and the "CRL Paragon," I am letting the fellows know through your magazine the results obtained from it.

On New Year's eve, Mr. McIntosh (6KI), an old-time radio friend of ours, now a resident of Glendale, a suburb of Los Angeles, was here to "listen-in," when using a one stage amplifier (pre-war "Electron Relay" detector and "Western Electric VT-1") in connection with the above receiver and "Baldwin" phones, we heard the following stations outside of California, in fact, the signals could be heard easily at a distance of five feet or more from the phones and all over the room at times, those most noticeable being 5ZA (Roswell, N. M.), and 7YA (Boise, Idaho). About a week ago, I heard 5ZJ (Mesilla Park, N. M.), and 6ZM (Salt Lake City, Utah) with the same audibility as above. Other stations copied with good audibility are 7CC (Moscow, Idaho), 7BQ (Pullman, Wash.), 7ZJ (Vancouver, Wash.), 7BP, 7DA, 7ZI (Portland, Ore.), 7GQ (Eugene, Ore.), 6JT, 6PE, 6OT, 6ZA (Salt Lake City, Utah), 6ZH (Richfield, Utah), 6BQ, 6QR (Reno, Nev.), 6UO (Yerington, Nev.), 6IG, 6GE (Douglas, Ariz.), together with a larger number in California.

Wishing continued success to the "P. R. N." for the New Year, I am,

Very truly yours,

H. C. SEEFRED, Radio 6EA.

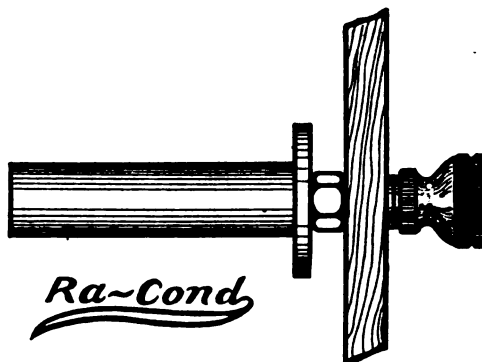
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CONDENSERS You Will Eventually Use

Hermetically sealed, insuring protection against leakage.

Made in two standard capacities. Phone Condensers .003. Grid Condensers .0003.

PRICE 75c
Postpaid in U. S.



The unique patented construction improves efficiency of your audion or amplifying panel,

eliminating unnecessary binding posts.

RA-COND will fasten on rear of panel to the grid or secondary binding post.

Manufactured only by

RADIO EQUIPMENT COMPANY

1525 NORTH FAWN ST., PHILADELPHIA, PA.

SECURE RA-COND CONDENSERS FROM YOUR DEALER, OR IF HE CANNOT SUPPLY YOU, SEND DIRECT, GIVING YOUR DEALER'S NAME

PROMPT MAIL service, from the heart of New York. We are in position to secure the latest things in radio development, *first*. We handle large enough quantities to get *preferred* shipments from the makers. Our prices clearly reflect the savings of a large volume of business at low expense. We have built up a sales force that is competent to help you in your selection. Mail orders are filled promptly and accurately, carefully shipped, and guaranteed to arrive safely. Send 10c for our new 84 page complete radio catalogue, *to-day*.

SPECIAL: Radio Service and Mfg. Co.'s ALUMINUM VT Sockets. Order a supply direct from this ad. We have plenty of these splendid sockets right here in stock, ready to be shipped the day we receive your order.

Single socket\$1.10
Double socket 2.75
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New York.

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No. CR-2 Grebe 175-680 Meters....51.00
No. CR-3 Grebe "Relay Special" 175-680 Meters65.00
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No. CR-6 Grebe 175-680 M. Det. and 2-step amplifier200.00

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No. P-2 Thordarson 500 Watt Type "R"24.00
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Note—These Thordarson transformers are splendid values at above prices.

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Acme 200 Watt, mounted\$20.00
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Acme 1½ Henry 500 MA double coll.\$8.00
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THE THIRD EDITION OF THE

Consolidated Radio Call Book

Very Greatly Enlarged--Will be Ready January 25th

192 pages. (32 pages more than 2nd edition,) better paper, stiff covers, etc.

Some of the special information contained in the new book: Radio rate sheet (charges to and from vessels, etc.); Weather reports and hydrographic reports of the world; Time signal section of the world; American radio compass stations; French radio compass stations; British radio compass stations; Canadian radio compass stations; General information section; International abbreviations; High power radio stations of the world; Press schedules of spark stations.

The Consolidated Radio Call Book is the only book in print officially listing all the Radio calls as issued by the Bureau of Commerce. Every vessel and land station in the world is represented and listed alphabetically, according to names of vessels or land stations, and according to call letters; Revision of American coastal stations under U. S. Naval control, and their new calls.

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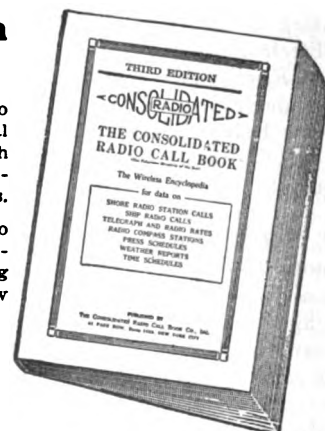
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Consolidated Radio Call Book Co., Inc.

BOX 141, PARK ROW, NEW YORK CITY



When writing to Advertisers please mention this Magazine

ADVANCE NOTICE OF A NEAR HAM

(Continued from page 217)

with the best oscillating characteristic that I can find.

On paper (!) it would seem that with the power from storage cells that I intend using, it would seem as though I OUGHT to get anywhere from 125 miles, reasonably (!) upward, by day, and from 1,000, upward, by night.

Being an out-and-out fisherman and big game pursuer, it has occurred to me that it might be a decided novelty for me to "broadcast" on my lil' 200 meters, each night, after April 1st, the fishing news of our wonderful waters here—that team with the finest game fish of the seven seas—and I have fished in 'em ALL! Also the weather conditions, names of sportsmen on the Island, and where they hail from, their catches, notes on the largest fish of each day—in short, any news that, as a newspaper man of many years, I think would be of interest to inland dwellers—those who might care to "listen" to me, o' nights.

My idea is to "broadcast" for, say 15-20 minutes, so as not to "hog," or have the appearance of trying to "hog," the air. If fellow-amateurs approve of this scheme, and will give me half a chance to work, I'll guarantee a few minutes of fun and "news" each night!

I am open, however, for all criticism—favorable and otherwise! Letters addressed to me at Avalon, Catalina Island, California, will reach unto my digits—duly—and I shall be glad to answer missives requiring acknowledgment. When the transmitter is installed I shall also be very happy to answer any questions about the fishing, etc., etc., and the EXACT hours that my call will "raise" me will be published in this magazine.

In order to obtain data, and to reimburse distant assistants for their trouble to this end, I shall send a check for \$5 to ye editor of "P. R. N.," if he approves, said sum to go each month to the operator that month who reports to me by mail having heard me at the greatest distance. In order to eliminate fakirs I shall send, at a stated hour each night, an easy sentence of four words—no figures or abbreviations—and each night the SAME. They will be sent slowly and steadily for, say, three minutes. And to him who posts me a report of his having heard them, and quotes them, from the farthest away, goes the "V."

All this providing Friend ED sees fit to lend editorial favor to the idea!

I trust that you fellows will hold out a helping welcome to the "fisherman" among ye!

We will be glad to act as the "half-way station" for passing along the five spots to the monthly victors, but we are of the opinion that you will have to sell a lot of fish to keep both sides of the ledger clear.—Ed.

Perhaps some of these stations would be interested to know they are received QSA at Calexico, Cal. The following, 6JN, 6EB, 6PZ, 6WM, 6AG, 6WK, 6KP, 6IF, 6BJ, 6IG, 6PR, 6ZM, 6LA, 6KM, 6EJ, 6EN, 6AK, 6SK, 6LN, 6PD, 6XD, and 6DP have been received with the greatest audibility to date. No amplification necessary.

A VACUUM TUBE UNIT

Will greatly increase the receiving range of your station. The combination shown opposite consists of the "A-M" Detector Unit and the Radiotron U. V. 200 tube. This makes a complete V T Detector outfit—well within the reach of every amateur.

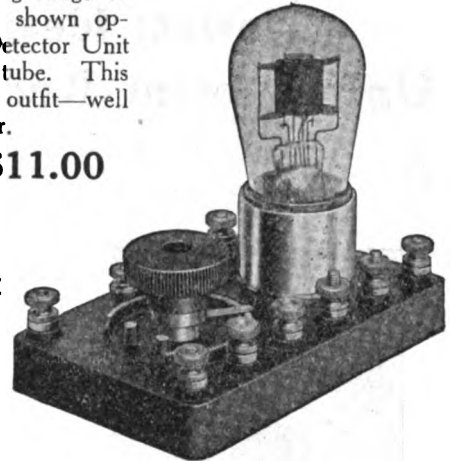
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Send in your order today

The "A-M" Vacuum Tube Unit

Incorporates in a single unit, a VT socket, filament rheostat, grid condenser, grid leak, and binding posts. Mounted composition base.

Get one at once,
and mount your own VT. **Price \$6**



Order your NEW Radiotron Tubes from Us

Radiotron U. V. 200

THIS NEW detector and amplifier is the latest product of the research laboratories of the General Electric Company. It has been specially designed to meet the requirements of the amateur and experimental field, viz: the production of a tube which would prove a sensitive detector and a superior amplifier, and which could be operated off a single standard 22½ volt plate battery.

Radiotron U. V. 200 is the best radio detector and audio frequency amplifier yet produced. It is particularly adapted to standard regenerative circuits, in which it functions with greater sensitivity and stability than any other tube.

Best detector action is provided by a grid condenser of 0.00025 MFD capacity and the Radio Corporation's standard grid leak of ¼ MEGOHM resistance. The plate voltage must be closely adjustable from 18 to 22½ volts. The requisite variation of the plate voltage must be obtained in three ways: (1) By a standard "B" battery potentiometer; (2) by a "B" battery with taps to each cell; (3) by a special "A" or filament battery

potentiometer of 200 ohms which will be manufactured by the Radio Corporation. In the case of the last-mentioned method the negative terminal of the "B" battery (which is tapped from the 12th cell) connects to the variable contact on the "A" battery potentiometer.

Radiotron U. V. 201

THE TUBE is also a newly designed detector and amplifier of the plecton type, which was developed in the General Electric Company's research laboratory. Experts who have tested this tube pronounce it to be the most efficient and stable amplifier available to date. The normal plate voltage is 40 (2 standard "B" batteries), but plate E. M. F.'s up to 100 volts may be used with increasing amplification. Price \$6.50.

All Radiotrons are manufactured in accordance with rigid specifications, assuring a uniform product.

They are made to fit standard four-prong sockets. Watch future announcements for data concerning the other types of tubes and devices which will be soon placed on the market.

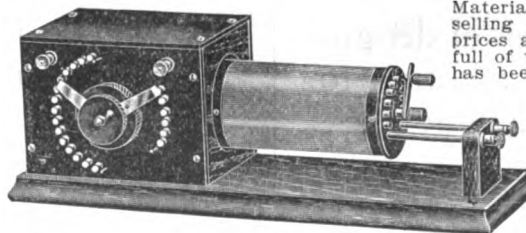
The NEW Radisco Better "B" Batteries
(Tapped), 22½ volt, 15 cell, with variable voltage feature.....\$2.65

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Arnold Navy Type Loose Coupler



Send 3c stamps for Bulletin No. 3

PRICE, \$20.00

This instrument is made of the best material obtainable and is equal to others selling for \$25.00 and higher, all fancy prices and frills are eliminated, is chock full of value and is made by a man who has been before the public for the past 8 years making Wireless apparatus.

It will tune up to 3,500 meters. I also stock the finest line of switch points, Hard Rubber knobs, Cabinets and accessories on the market. Prompt delivery of all orders has distinguished me.

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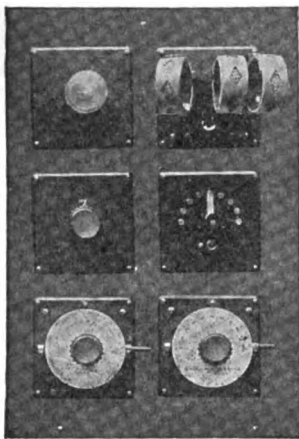
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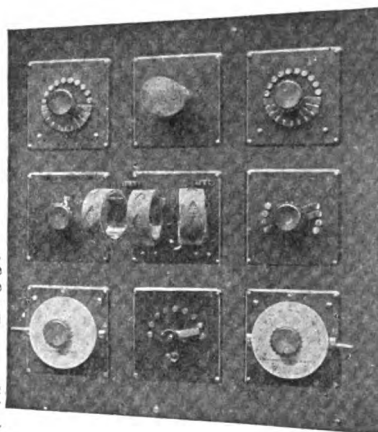
Newest Ideas in DeForest Unit-System Receiving Apparatus

ADVANTAGES of the Unit-System include extreme economy due to the simplicity and interchangeability of the Units; convenience in arranging circuits of the individual need; and greater operating efficiency due to the engineering design and quality of the instruments. The Unit Sets shown here are examples.



SIX PANEL UNIT SET

comprising a combined Tuner and Detector to receive all local stations and practically any large station in the world. Everything necessary for the operation of the set, including detector tube, "B" battery, head phones and a set of 11 coils, can be had for \$75.00 complete. (Purchaser to furnish panel board and "A" battery). This set will give greater satisfaction than any outfit at anywhere near this price. Expansion possibilities unlimited.



NINE PANEL UNIT SET

comprising the same six panels shown above, and either three additional panels to give one step of amplification, or three panels to increase the efficiency of the original six. The former will add about \$23.70 to the cost of the original six; the latter about \$12.10.

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Prices on DeForest Radio Apparatus have been reduced until present prices are practically the same as were effective about one year ago.

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Professional Radio Equipment at Amateur Prices!

IT TOOK three years to develop the ABC line of Standardized radio apparatus. Many of the instruments, and all of the small parts are now ready for the market. Automatic machines are turning them out quicker, better and cheaper than ever before. Send a nickel for our advance booklet. It describes the small parts, the ABC sectional unit cabinets, the variable condenser, the new mica grid condenser, the Vibratone, Jr., etc. Send for the booklet to-day. You'll find it interesting.

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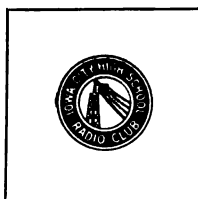
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Be sure to see these new numbers, which will put new life in your club

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One Step Amplifier

Panel size 4x6½ in. 30 day special price \$12.25 prepaid.

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Panel size 6½x8 in. 30 day special price \$22.50 prepaid

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Manufacturers and Dealers

Drawer 307

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PACIFIC RADIO PUB. CO.

50 Main St., S. F., Cal.

Storage Batteries

You can buy that storage battery through this association and save considerable money securing fast delivery. The same applies to many other radio instruments of standard make.



T-3 20-40 ampere hour	\$16.25
T-4 40-60 ampere hour	20.00
F-1 60-80 ampere hour	19.00
F-2 80 up ampere hour	24.00

The above batteries are capable of furnishing 6 volts at 1 ampere for periods stated and are the most economical source of tube filament heating current. We supply a complete line of all standard radio goods on which you secure SERVICE and SAVING when you buy through us.

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Dept. P.

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Mail inquiries will be given our prompt attention. Send for list of used apparatus.

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who send orders to the G. A. never experience endless delays and needless letter writing.

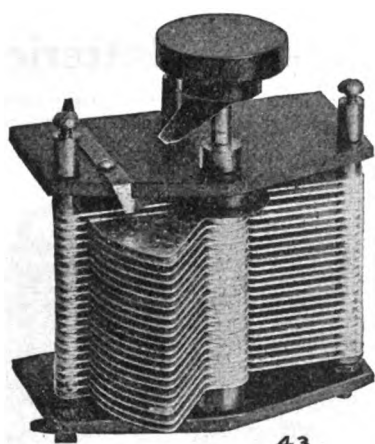
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Add 5c for mailing

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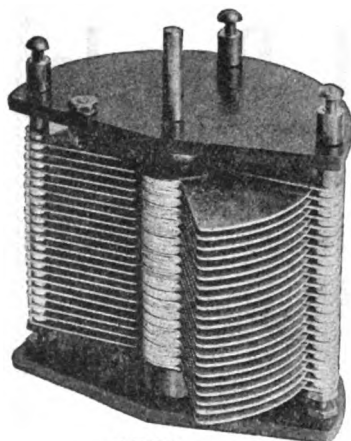
In nearly every country of every continent, from Bombay to Cape Town, from Madrid to Rio, from Sidney to Hawaii, G. A. Condensers are in service, replacing expensive fixed condensers or grid leaks and grid condensers. Many manufacturers use them as standard equipment on their apparatus. You To . . . — .



THE GENERAL APPARATUS COMPANY, Inc., 570-P West 184 St.
NEW YORK CITY



43



4300

Announcing a New Variable Condenser

Built along the same general lines as our SERIES "S" condenser, but heavier construction throughout. The plates are die-stamped from 1/32" hard rolled aluminum, and are separated by heavier spacers. Extreme rigidity, best of materials, accurate machine work and careful assembly are the outstanding features of construction. At the present time we are unable to fill orders for the SERIES "S" condenser, as we are unable to obtain materials for its construction, but we can ship the NEW SERIES "T" and the SERIES "L" VARIABLE CONDENSER from stock.

REMEMBER—WE ABSOLUTELY GUARANTEE SATISFACTION OR YOUR MONEY BACK.

SERIES "T"			—PRICES—	SERIES "L"		
No. 20	2 plate	VERNIER\$2.00	No. 2300	23 plate, .00075\$ 6.00
No. 70	7 "	.0001 m.f.2.35	No. 4300	43 plate, .00138.00
No. 130	13 "	.0002 m.f.2.75	No. 6300	63 plate, .00210.00
No. 170	17 "	.0003 m.f.3.15	Either style of condenser fitted with indicating dial at additional cost of 75c.		
No. 230	23 "	.0005 m.f.3.60			
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LOS ANGELES, CAL.

The Latest Gaseous Vacuum Tubes

make necessary the use of a variable voltage. And what method of variation is more convenient, efficient and economical than that employed in the "VARIABLE STANDARD VT BATTERY?"

The "VARIABLE STANDARD VT BATTERY" combines all the desirable advantages of cast en bloc batteries with the additional feature of close variation without current loss. Each cell is tapped,

thus allowing variation by steps of 1½ volts—from 1½ volts to 22½ volts.

Should your tube require more than 22½ volts, add either our Type No. 7623 STANDARD VT BATTERY, or Type No. 7625, for the initial 22½ volts. With tubes requiring less than 22½ volts, use Type No. 7650 "VARIABLE STANDARD VT BATTERY."

For long service we recommend Type No. 7623, \$1.50. For longer service Type No. 7625 at \$2.65, or Type No. 7650 (Variable) at \$3.50 are recommended. \$5.00 will buy 45-volts, with the last 22½ volts variable—use No. 7623 and No. 7650 units.

LET YOUR DEALER KNOW YOU WANT WHAT YOU WANT BY ASKING
FOR A "STANDARD VT BATTERY" AND NOT FOR A "B" BATTERY

RICHTER-SCHOTTLER CO., MFRS.

198 ROEBLING STREET

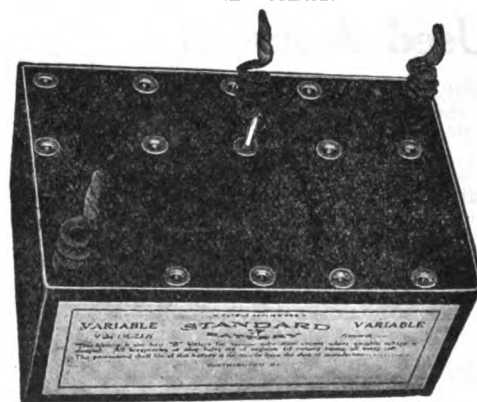
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RADIO PHONISTS, ATTENTION—HIGH VOLTAGE GENERATORS. We supply motor generator units in various capacities, especially designed for radio phone work. Low powered rotary converters, dynamotors, fractional H. P. motors, storage batteries. Various types of meters, condensers, navy type "4" nickel plate brass engraved dial, spark gap rotors, **SYNCHRONOUS SPARK GAPS.** **RAY-DI-CO RADIO PHONE** sets furnished knocked down ready for assembling and your connection. Get acquainted with our **SERVICE.** **RAY-DI-CO, 2653C N. Clark St., Chicago, Ill.**

EXPERIMENTERS! Laboratory apparatus, scientific instruments, chemicals, etc., reach you in very short time when bought from **AMIDO APPARATUS COMPANY, 3118 14th St., Washington, D. C.** Our prices are guaranteed to knock other firm's prices cold. Catalog and big scientific mall, 5c, stamps.

HONEYCOMB COILS cheapest on the market. Just as good as the best. Note these prices: 25 turns, 45c; 35 turns, 45c; 50 turns, 55c; 75 turns, 60c; 100 turns, 65c; 150 turns, 70c; 200 turns, 75c; 250 turns, 80c; 300 turns, 85c; 400 turns, 90c. Postage extra. Superior Coil Co., 1831 Balboa St., San Francisco, Cal.

Our advertisement, page 226. Discriminating amateurs use our instruments. Absolute satisfaction guaranteed. **HI-Grade Wireless Instrument Co., Asheville, N. C.**

COMMERCIAL Type Rotary Spark Gaps with hard rubber uprights and bakelite rotor. Motor will operate on 110 volts, A. C. or D. C. Best buy on the market. \$12. Add postage on 11 pounds. **Radio Development Co., P. O. Box 2114, San Francisco.**

HURRY and read our advertisement on page 226. **HI-Grade Wireless Instrument Company, Asheville, N. C.**

ALL amateur apparatus bought or made in accordance with the **Radio Buyers' and Builders' Handbook** invariably resell very profitably. Study my June, July, October and December display advertisements. See why and get your copy. **R. Clark, Barnes Road, Newton, Mass.**

FOR SALE—One 3,000 Meter Tresco Tuner; two weeks' use; \$8. postpaid. **D. G. Strawn, Calexico, Cal.**

FOR SALE—Clapp Eastham loose coupler, \$12; **Murdock .001 variable,** \$4; **Audiotron,** \$4.75; **Remier control panel,** \$11, cost \$15; **Murdock Tuning Coil,** \$2.50; **DeForest crystal detector,** \$2; postage extra. Wanted honeycomb coils. **James Walker, San Dimas, Cal.**

NO TUBES SOLD

without complete instructions for operating efficiently.

ELECTRON RELAYS and A-P AMPLIFIERS

personally tested on actual receiving. A new tube or your money refunded if you are not satisfied.

B. F. McNamee

2436 Stuart St., Berkeley, Calif.

REYNRAD SPECIALTIES

SUPERIOR RECEIVING EQUIPMENT

The Reynrad RR-74 Multiwave Tuner and Audion Detector is an exceptionally fine receiving outfit mounted as a cabinet unit and within the reach of all. When used in conjunction with our RA-72 Two-Step Amplifier at our Testing Station, music and Radio Phone conversations have been heard from both coasts—an exceptional record.

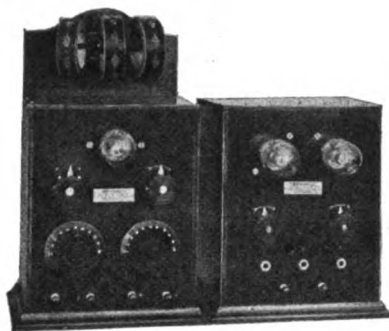
With our RCR-30 complete receiving set, ships have been readily heard over a distance of 1500 miles, mostly overland and amateurs copied over 1000 miles away. These receiving records place the Reynrad RCR 30 on a par with numerous audion sets.

These instruments are compact and artistic in design.

RR-74 Multiwave Tuner and Detector with bulb only.....\$60.00

RA-72 Two-Step Amplifier, with bulbs.....\$55.00

RCR-30 Crystal Receiver Set, with 3000 ohm Phones.....\$30.00



RR-74 and RA-72

REYNRAD SHORT WAVE COILS

Just what you have been looking for. Single Layer inductances, wound on heavy 4-inch Bakelite tubes, with standard De Forest plugs. A set of three will bring in amateur stations as you never have heard them before. An additional secondary coil will make your receiving outfit equally efficient up to 600 meters. State wave length desired, 175-300 or 300-600.

Reynrad Short Wave Coils.....\$2.00 each

Standard De Forest Plugs for H. C. or

D L Coils.....\$.65 each

We carry a large stock of Standard apparatus and supplies. Acme, Murdock, Clapp, Eastham, Magnavox and De Forest Agents. Send 6 cents in stamps for catalog and we will also place you on our mailing list.

Correspondence Solicited
REYNOLDS RADIO SPECIALTY CO.,
729 South Prospect Street
COLORADO SPRINGS COLORADO



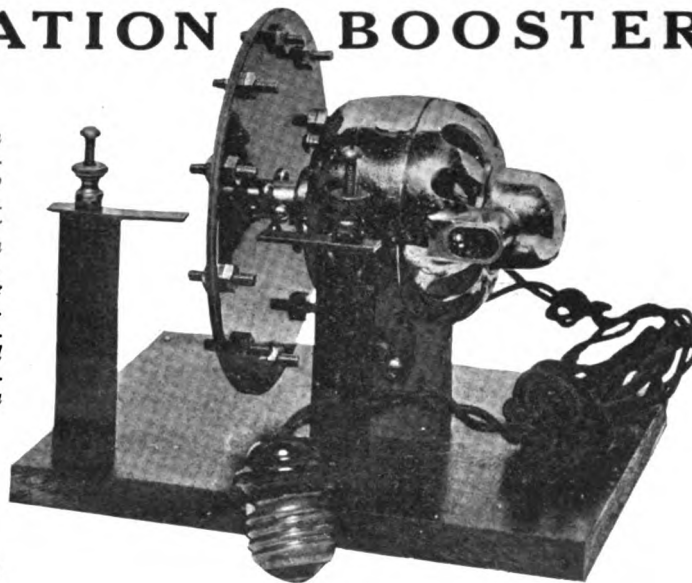
RCR-30, CRYSTAL SET

LET THIS BE YOUR NEW YEAR'S RESOLUTION—

Resolved—That I will Use a Good Rotary Gap Throughout the Year of 1921 and Will Cease to Jam the Air With that Inefficient, Mushy Spark.

A GOOD ROTARY GAP IS A RADIATION BOOSTER

The illustration shows our commercial type Rotary Gap with 110 Volt Motor. Will operate on either A. C. or D. C. Ten Stud Motor, constructed of best grade Bakelite Hard Rubber Stationary Electrode Supports. Cord and Plug Attachment Supplied with each Gap.



\$12.00

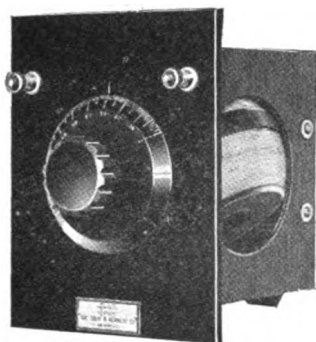
Include Postage on eleven pounds

THIS GAP WILL HANDLE ONE KILOWATT SAFELY. ROTARY AND STATIONARY ELECTRODES ARE EASILY RENEWED.

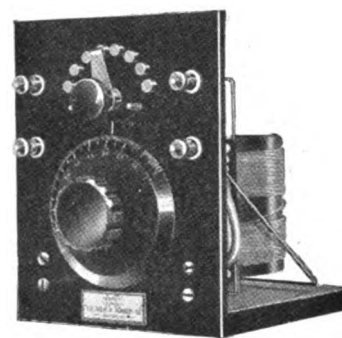
Our New Bakelite Audion Control Panel with V.T. Socket, Rheostat, "B" Battery Switch, Nicked Binding Posts and Brackets for Table Mounting, \$8.00.

RADIO DEVELOPMENT COMPANY

Manufacturers of High-Grade Radio Apparatus
P. O. BOX 2114 SAN FRANCISCO



KENNEDY EQUIPMENT



VARIOMETER AND VARIOCOUPLER

IN FULL KEEPING WITH THE HIGH QUALITY KENNEDY LINE

TYPE 909 VARIOMETER ————— **\$8.50**

Type 909 Variometer with special Kennedy commercial type bakelite knob with nicked brass bushing and 3-inch bakelite dial. \$ 9.90

Type 905 Mounted unit as illustrated above...\$12.25

TYPE 919 VARIOCOUPLER ————— **\$7.00**

Type 919 Variocoupler with special Kennedy commercial type bakelite knob with nicked brass bushing and 3-inch bakelite dial. \$8.40

Type 915 Mounted unit as illustrated above...\$11.75

Send for Bulletin 901 for more complete description

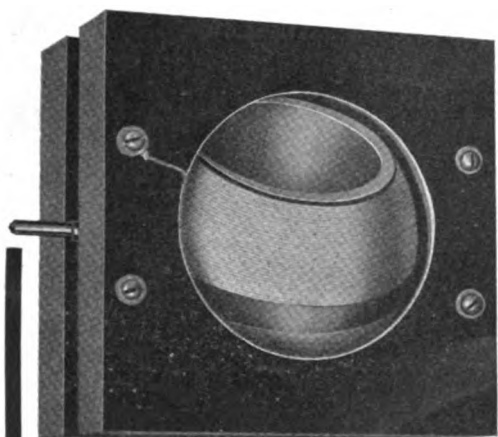
ABSOLUTELY AND UNCONDITIONALLY GUARANTEED TO GIVE COMPLETE SATISFACTION

Sent POSTPAID on Receipt of Price if Your Dealer Can't Supply You.

THE COLIN B. KENNEDY COMPANY

RIALTO BUILDING

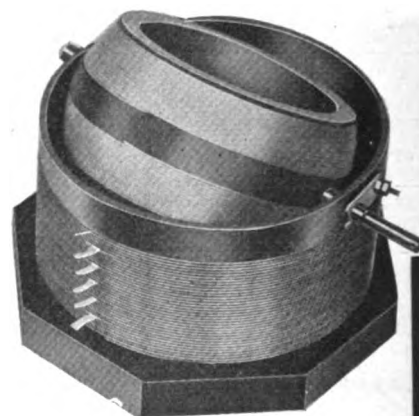
SAN FRANCISCO



"CESCO"

—is the trade name given the low-priced, high-quality, guaranteed apparatus distributed exclusively by the California Electric Supply Co. of San Francisco. Buy "CESCO," save money, and be satisfied. If your dealer cannot supply you with the following—write us direct.

Note the low price



CESCO VARIOMETER

V-100—CESCO Variometer for the grid and plate circuits of short wave regenerative receivers. Correctly designed and carefully constructed of thoroughly seasoned hard maple—cannot and will not warp, shrink, or crack, as soft wood variometers frequently do. All windings bound and insulated with CESCO special impregnating compound. Price, postpaid—\$8.50. Order number V-100.

\$8⁵⁰

CESCO VARIOCOUPLER

C-100—CESCO Variocoupler for use in connection with CESCO variometer. The secondary is ball type. Primary consists of a threaded tube 4 inches in diameter and 2 inches high, made of unshrinkable composition and wound with large-gauge bare copper wire. An efficient instrument, sturdy and durable. CESCO VARIOCOUPLER complete, mounted on hardwood base for panel mounting, retail price—\$6.75. Order number C-100.

\$6⁷⁵

Any other supplies you need now? We have them. And your inquiries are welcome as your orders. We supply every want the way you want it supplied.

DEALERS—
WRITE US

CALIFORNIA ELECTRIC SUPPLY CO.

543 MISSION STREET, SAN FRANCISCO

DEALERS—
WRITE US

"Radio Supplies That R Right"

"T R T S"

Trust Radio Telephone Service

The Radio Telephone Shop

—is both "Radio College" and "Radio Shop"

We are called a "Radio College" because we are always glad to answer questions, to explain new apparatus and equipment, to help the amateur solve all his problems, and come to his assistance at any time. How can we help you? What do you want to know? Fire your questions at us. Come in and talk them over or write us a letter.

As a "Radio Shop" we can serve you efficiently. Most dealers handle only such lines and articles as will sell quickly. But it is our policy to maintain an up-to-the-minute assortment, and to stock new and worthy apparatus as quickly as it appears. "If it's made you can get it from the Radio Telephone Shop."

METERS

All meters are 3-inch flush type unless otherwise specified—500-volt D.C. voltmeter.....	\$15.00
0-100 MilAmp, meter, D'Arsonval type.....	9.00
0-500 MilAmp, Meter	11.00
0-2 Amp. Meter for filament reading.....	13.00
General Radio Meter 0-250 Milamps.....	8.00
Same type 0-500 Milamps	8.00
Same type 0-1 Amps	8.00
Same type 0-2 Amps	8.00
Same type 0-3 Amps	8.00
Elridge 0-5 raised mounting.....	6.00

INDUCTANCES

Formica Tube, 6-inch diameter and 5-inch long, grooved ten to the inch.....	\$4.00
Same, but wound with No. 14 bare, hard-drawn copper wire	6.00

TRANSMITTERS

Telephone Transmitters with extension arm.....	\$4.00
Telephone Transmitter without arm.....	3.25
These are but a few of the items typical of our large stock of standard supplies. If you don't see what you want, ask for it.	

The New RADIOTRON

Radiotron U. V. 200

This new Detector and Amplifier Tube is the latest product of the Research Laboratories of the General Electric Company. It has been especially designed to meet the requirements of the Amateur and experimental field, viz: the production of a tube which would prove a sensitive detector and a superior amplifier, and which could be operated off a single standard 22½ volt plate battery.

RADIOTRON U. V. 200 is the best radio detector and audio frequency amplifier yet produced. It is particularly adapted to Standard regenerative circuits in which it functions with greater sensitiveness and stability than any other tube.

Best detector action is provided by a Pen Brand grid condenser of the correct capacity, and the Radio Corporation's Standard Grid leak of ½ megohm resistance. The plate voltage must be closely adjustable from 18 to 22½ volts.

ORDER YOUR PEN BRAND GRID CONDENSER AND RADIOTRON TODAY

Radiotron U. V. 201

This Tube is also a newly designed detector and amplifier of the Plotron type, which was developed in the General Electric Company's Research Laboratory. Experts who have tested this tube pronounce it to be the most efficient and stable Amplifier available to date. The normal plate voltage is 40 (1 standard "B" Battery), but plate E. M. F.'s up to 100 volts may be used with increasing amplification.

All Radiotrons are manufactured in accordance with rigid specifications, assuring a uniform product. They are made to fit standard four-prong sockets.

PRICES:

No. U. V. 200 RADIOTRON (Gas content detector and amplifier)	\$5.00
No. U. V. 201 RADIOTRON (Plotron detector and amplifier)	\$6.50
(Include Postage on one pound parcel post.)	

RADIO TELEPHONY—Consult us on your radio telephone needs. Come in and see a complete radio telephone, made up for you to see, to copy if you wish. Radio Telephony is not an experiment, but a proven fact. Radio Telephony is for you; the fascination of talking hundreds of miles through the air, for you; the cost within your reach. A moderate amount of money buys complete parts for installations at the *Radio Telephone Shop*, the latest, the best. Write for price list and complete information.

We carry a full line of receiving and sending apparatus of all kinds and makes. We handle Murdock, Clapp-Eastham, Acme, General Radio, DeForest, Brandes and other well-known and Standard makes.

What radio apparatus do you need? Send your orders to the RADIO TELEPHONE SHOP, and get what you want SHIPPED IMMEDIATELY.

Orders received by us are forwarded the same day we get them. That's service for you—

The Radio Telephone Shop

175 STEUART STREET

SAN FRANCISCO, CAL.

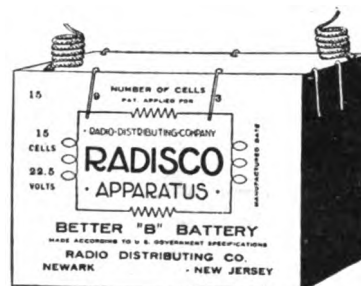
Radisco BETTER "B" BATTERIES are back!

FOR THE PAST few months manufacturing difficulties and inferior materials made it advisable to limit the production of Radisco Better "B" Batteries. In the meantime, however, our research work has developed new methods, better materials, and more economical manufacturing principles. Now, the NEW Radisco Better "B" Batteries are ready.

Powerful batteries with an operating life of 600 to 1000 hours—sturdy and well built throughout—no batteries at any price are as good—no batteries at any price are better.

The Radisco dealer in your district has a complete stock of the NEW Better "B" Batteries. Get your supply from him!

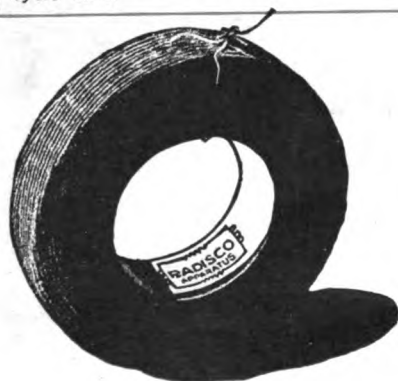
No. 1 $3\frac{1}{4} \times 2 \times 2\frac{1}{2}$ inches \$1.50 Shipping Wt. 2 lbs.
No. 2 $6\frac{1}{2} \times 4 \times 3$ inches 2.65 Shipping Wt. 5 lbs.



Both 15 cells, 22½ volts. Larger size has exclusive Variable Voltage feature. Ask your dealer to explain it.

SPECIAL NOTICE TO RADIO PHONE EXPERIMENTERS—

Do you know that Radisco Better "B" Batteries make a thoroughly reliable and satisfactory source of high voltage for Radio Phone and other CW work. A Radio Phone operating on Radisco "B" Batteries is exceptionally quiet and free from the disagreeable hum of a motor generator or the rectified 60 cycle tone.



Radisco Coils: The deserved popularity of these famous coils continue to increase daily, in spite of the many freakish coil windings that are now flooding the market. Most experienced Radio men are glad to recommend universal wound coils, with their minimum high frequency resistance and low distributed capacity. Users of Radisco Coils have found, *without exception*, that they give better service, in direct comparison with coils that cost much more.

Radisco Coils are made in 17 sizes, tapped and plain, with wave length range from 200 to 20,000 meters. Your Radisco dealer has a complete stock of all sizes, and will be glad to help you select a combination that will give good results and will work well with the rest of your equipment.

THESE PROGRESSIVE DEALERS CARRY THE ENTIRE RADISCO LINE

ALBANY, N. Y.
Shotton Radio Mfg. Co.
8 Market St.

ASHEVILLE, N. C.
Hi-Grade Wireless Instrument Co.

ATLANTIC CITY, N. J.
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518 N. Connecticut Ave.

BALTIMORE, MD.
Radio Engineering Co.
614 No. Calvert St.

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The Wireless Shop
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Geo. N. Delaplaine,
306 George St., and
8th and Magnolia Sts.

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Rose Radio Supply
604 Gravier St.

NEWARK, N. J.
A. H. Corwin & Co.
4 West Park St.

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Pennsylvania Wireless Mfg.
Co. 507 Florence ave. "8HA"

OMAHA, NEBRASKA
O-B Radio Supply Co.
406 Brown Building

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Rhode Island Elec. Equip. Co.
45 Washington St.

PITTSBURGH, PENN.
Radio Electric Co.
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Northwest Radio Service Co.
609 Fourth Ave.

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Shotton Radio Mfg. Co.
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WICHITA, KAN.
The Cosradio Co.
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This Mark



Your Guarantee

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

A-P tubes transmit to Scotland

3,600 miles transmission. There's a DX record for you, and there are others, many others—with A-P tubes. Results count—that's what you're after, isn't it? Results prove that A-P tubes are the best tubes made, the tubes **you** should use; and here are some of the results:—

Use

A-P

tubes for
efficiency

1. Using three **A-P transmitting tubes** in a radiophone set, Hugh Robinson of Keyport, New Jersey, not only transmitted phonograph music, but actually **talked to Scotland** and was distinctly heard on three separate occasions during November and December, 1920. Distance covered approximately 3,100 miles by great circle.

2. With a single **A-P Electron Relay**, an amateur in New York (name on request) repeatedly hears communications between California amateur spark stations.

3. San Francisco amateurs (names on request) regularly receive day and night European communications from Carnarvon, Nauen, Bordeaux, and Rome, with moderate single-wire antennas and a single **A-P Electron Relay**.

Use

A-P

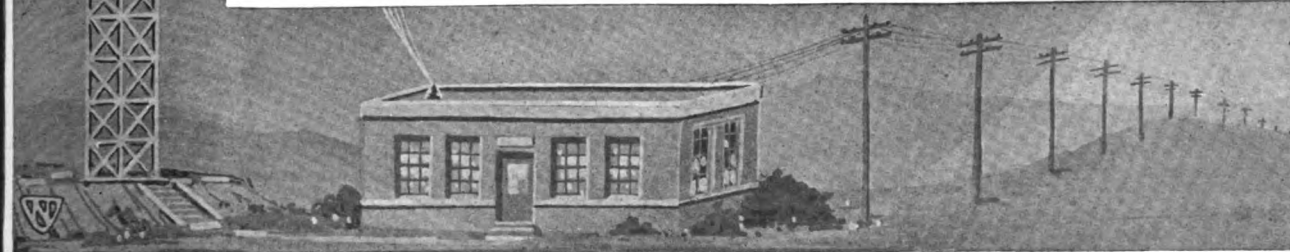
tubes for
efficiency

For sure results, for better results, for utmost efficiency, use A-P tubes and only A-P tubes. Licensed by the Radio Corporation of America under DeForest Audion and Fleming patents, for amateur and experimental use in radio communication. Equipped with SHAW condensite four-prong base. The A-P VT Amplifier Oscillator—price \$7. The A-P Electron Relay—price \$6. The A-P Transmitting Tube—price \$7.50. Order from your dealer.

PACIFIC RADIO SUPPLIES CO.
638 Mission St., San Francisco, Cal.

ATLANTIC RADIO SUPPLIES CO.
8 Kirk Place, Newark, New Jersey

Distributors for Moorhead Laboratories, Inc.





CUNNINGHAM

TYPE C-300

THE IDEAL AMATEUR TUBE

TYPE C-300

\$5.00

This is only one of many letters already received. Let me know your results—if they are exceptional I should like to publish them

Read What 6BJ Says:

"No doubt you would like to know the wonderful work I have accomplished using your new C-300 Detector Tube. Since I have installed your tubes at my station located at Burlingame, California, call 6 BJ, I have heard more distant amateur stations than I have ever heard in my life. I have been a constant user of vacuum tubes for the past ten years, and believe me, I know a real tube when I see it. I have succeeded in hearing stations in Nebraska and Arizona with only one step of amplification and have established communication with many that I never before could hear. You have my permission to use this letter so the many amateurs throughout the United States will know what I think of your most excellent tube. I use regenerative tuning with Radio Shop Variometers."

(Signed) HALL BERRINGER.

E. J. Cunningham

TRADING AS

AUDIOTRON MFG. COMPANY

35 MONTGOMERY STREET

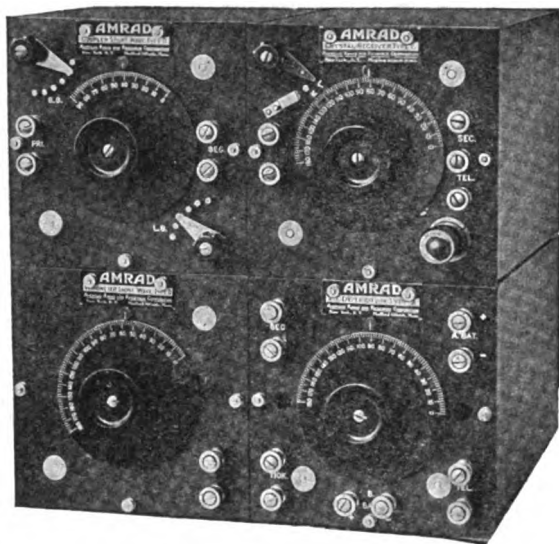
SAN FRANCISCO

AMRAD

The Recognized Symbol of Superior Performance

**Something
New
Under the Sun---**

The Amrad Unit System



MODERN RELAY RECEIVER
(One of Fifteen Combinations)

Includes a group of complete Receiving Units designed solely for the wireless experimenter to meet his need as he progresses to the topmost pinnacle in Radio. Called the most practical, convenient and efficient standardization plan ever developed. Practical because economical—you need never discard your original apparatus as you improve your station; convenient because each Unit is uniform in design, size and finish—you avoid fussy construction work; efficient because each Unit is designed by commercial Radio experts to give maximum results, and because the final group of Units produces as fine a receiving station as can be desired.

TO AMRAD GAP USERS:

Send us the type number and serial number of your gap with 10c postage and we will forward you free of charge a set of the new Amrad Leak-Proof Gaskets which insure perfect quenching and a smooth note under all conditions.

The Amrad Unit System comprises ten complete Receiving Units—Couplers and Variometers, short and medium wave (mounted and unmounted); Crystal Receivers; VT Detectors; VT Detector Amplifiers; and VT one and two stage Amplifiers.

Please inspect these high-grade receiving Units at your Amrad dealer's, or ask us for further information.

DEALERS—The Amrad Unit System meets every demand on the Radio experimenter from the earliest to the most expert stage. Once an Amrad user, always an Amrad user.



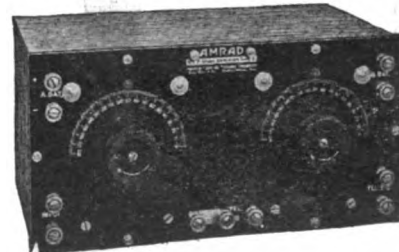
Amrad Coupler, \$17.50



Amrad Variometer, \$14.50



Amrad VT Detector, \$15.00



Amrad VT 2-Stage Amplifier, \$39.50

Bulletin V describing above units sent free. Complete Amrad Catalog Sent on Receipt of Ten Cents in Stamps.

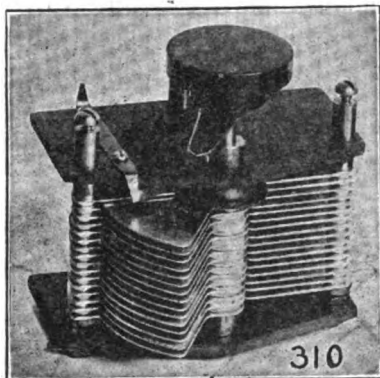
AMERICAN RADIO AND RESEARCH CORPORATION

Address all Communications to New York Office

2420 Park Row Bldg.
New York

Factory and Laboratory
Medford Hillside, Mass.

When writing to Advertisers please mention this Magazine



Wireless Shop Variable Condensers

Are Recognized as
Quality Instruments

They are being used by several manufacturers of high grade equipment, by the Bureau of Standards, and by the AMATEUR who recognizes QUALITY, in all parts of this country as well as in several foreign lands.

WHY NOT MAKE THE CONDENSERS IN YOUR NEW SET "WIRELESS SHOP VARIABLES?"

You can't go wrong, as they are fully guaranteed to give satisfaction, or we will cheerfully refund your money. What more could you ask? Ask some of the other fellows how they like their "Wireless Shop Variables."

The rugged construction of these condensers and the quality of workmanship will surely please you if you want, and expect to have, only the BEST. Made in two styles and eleven sizes. EVERY DETAIL RIGHT. Aluminum plates and spacers. FORMICA Insulation.

SERIES "T"			— PRICES —	SERIES "L"		
No. 20	2 plate	VERNIER	\$2.00	No. 2300	23 plate, .00075	\$ 6.00
No. 70	7 "	.0001 m.f.	2.35	No. 4300	43 plate, .0013	8.00
No. 130	13 "	.0002 m.f.	2.75	No. 6300	63 plate, .002	10.00
No. 170	17 "	.0003 m.f.	3.15	Include postage for two pounds		
No. 230	23 "	.0005 m.f.	3.60	Specify if you want brass or nickle pointer and mounting screws		
No. 310	31 "	.0007 m.f.	4.30	Prices include knob and pointer and mounting screws.		
No. 430	43 "	.001 m.f.	5.25	Indicating dial furnished at 75c additional.		
No. 630	63 "	.0015 m.f.	7.50			

Include postage for one pound.

WATCH OUR ADD NEXT MONTH FOR A NEW RADIO-PHONE AND "CW" VARIABLE

The Wireless Shop

511 W. WASHINGTON STREET

A. J. Edgcomb

LOS ANGELES, CAL.

Western dealers, write to the Leo J. Meyberg Co., San Francisco, Cal., for sales propositions. You will find "Wireless Shop Variables" a profitable line.



Announcing

The RADIO MAGNAVOX

The Latest Development
of the

MAGNAVOX COMPANY

For Every Radio Station

AT A

Price Within Reach of All.....\$45

DEALERS WANTED EVERYWHERE

The Radio Magnavox is constructed under the same patents and on the same electro-dynamic principle as the Magnavox Radio Telemegafone, and will emit the same volume of sound with a slight increase of field current. Extremely satisfactory results may be obtained by the use of 2 to 4 dry cells.

THE MAGNAVOX COMPANY

Oakland, California

When writing to Advertisers please mention this Magazine

Another Grebe Triumph!

150-3000 Meters

After much experimental work, we have succeeded in adopting the Armstrong Regenerative circuit to a receiver having a wave-length range of 150-3000 meters. The result is the



Type CR-5

Regenerative Receiver



This is a complete receiver. The only additional equipment needed are phones, batteries and a detector tube. Included in its range are amateur, navy and commercial wave-lengths, special land stations, ship CW stations, navy low-wave arcs, all radio phone work and "Time." In operation, it is the last word in simplicity.

Ask to see it at your dealer's today.

GREBE RADIO apparatus is licensed under the original Armstrong and Marconi patents.

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Continental Radio and Electric Corp., New York.
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Doubleday-Hill Electric Co., Pittsburgh, Pa.
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F. D. Pitts Co., Inc., Boston, Mass.
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Western Radio Electric Co., Los Angeles, Cal.

A. H. GREBE & CO., Inc., 73 Van Wyck Blvd., Richmond Hill, N. Y.

Radio Apparatus

Distributors of Reliable Radio Apparatus to Schools, Colleges, and Experimenters all over the world.



"PITTS"CO

The Sign of Service and
Prompt Delivery
All We Ask is a Trial!

"REMEMBER"

When you say "PITTS"CO you think
of Everything in Radio!

AMPLIFYING TRANSFORMERS

No. 166A Gen. Radio, unmounted....\$4.50
No. 166A Gen. Radio, mounted..... 7.00
No. Z7392 Clapp Eastham, unmount. 4.00
No. Z7392A Clapp Eastham, mounted 6.50

COIL MOUNTINGS

No. LC-101 with gears and base....\$12.00
No. LC-201 with gears and base
and primary switch.....13.00
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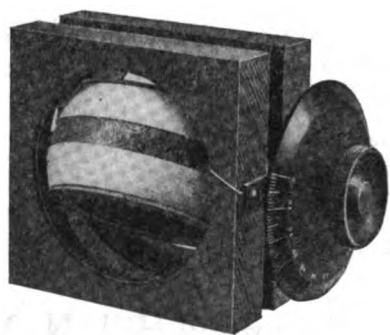
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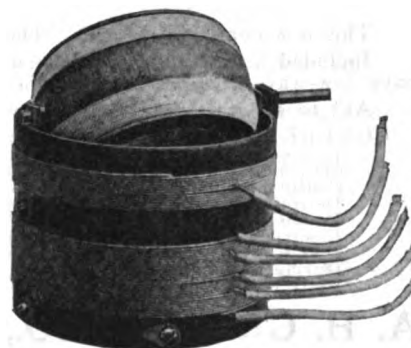
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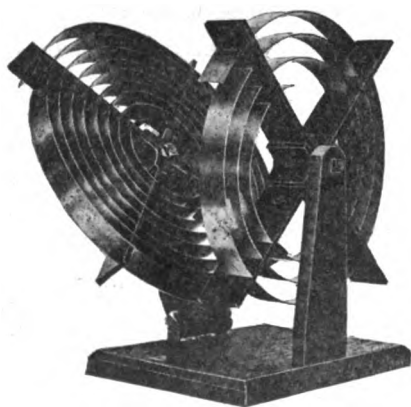


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WHO WROTE THE EDITORIAL IN THE JANUARY "RADIO NEWS"?

HAVE you read the editorial in the January issue of Mr. Gernsback's publication, "Radio News?" This is not a bit of free advertising for the publication mentioned, but the editorial is such a conglomeration of nonsense that every radio man will need to hear of it. Here it is:

published the bill in full. No other radio publication gave you a copy of it.

Please note in the editorial from the "Radio News" that the writer of same states that misdirected efforts were converged upon the amateurs, stirring them up to no good purpose. The misdirected efforts, to a great extent, were

NOT saying that he did NOT know of it.

"It is the old story of yelling wolf when there is no wolf in sight"—says the editorial. It should have read as follows: "Why holler wolf when someone else has already driven the wolf away." But, on the other hand,

RADIO BILL S4038

SENATOR POINDEXTER introduced the above bill March 8, 1920, in the Senate, and this bill was referred to the Committee on Naval Affairs.

This bill, which in many respects is harmless, and in a few instances, if passed, would seriously hamper us amateurs, was carefully studied by us the minute it appeared. Private advice, expert advice, as well as our own opinion, made it seem certain that this bill never had a chance to become a law in its original form.

Of course, we watched the bill carefully through all its phases, and very recent information from our Washington representatives makes it appear certain that bill will not come up for some time to come. No further hearings have been arranged for by the committee. There were hearings on this bill last spring, but since that time nothing of importance has occurred.

It has been the policy of the editor not to stir up the amateurs and make them write letters to their Senators and Representatives unless there was actual danger that certain bills might become law. We have always felt that if real danger existed, an S. O. S. to the amateur fraternity was in order.

We were therefore dismayed that in some quarters very zealous but misdirected efforts were converged upon the amateurs, stirring them up to no good purpose. It is the old story of yelling wolf when there is no wolf in sight. Then when the danger really does come, the appeal falls upon deaf ears. Statesmen in Washington do not like to be bothered, and stirred up every little while by busybodies, when real danger is threatening the amateurs.

The amateur fraternity can rest assured that whenever real danger threatens, they will be advised quickly and effectively.

Now that you have read the editorial, what do you think of it? Who is right—the man who wrote the editorial quoted above or the instigators of the plan to kill the bill before it could go any further? Let us here add that the editorial is not signed by Mr. Gernsback. Perhaps his office boy wrote it—It sounds like it! The old slogan—"In time of peace prepare for war"—applies well in this case. The bill is of such a dangerous nature that, if passed, it would seriously affect the future of amateur radio. "Pacific Radio News"

those employed by the publishers of QST and "Pacific Radio News"—if we understand the editorial correctly. Can these efforts rightfully be called misdirected? Don't you believe in swamping destructive legislation before it gets a handicap on us? To tell you the truth about the matter, fellow amateurs, we are of the opinion that the writer of the editorial never heard of the bill until he read it in "Pacific Radio News."

Well, at any rate, we hope that he knew of the bill. Mind you—we are

we extend our thanks to the writer of the editorial for the last paragraph of same, which reads: "The amateur fraternity can rest assured that whenever real danger threatens, they will be advised quickly and effectively" That's just what "QST" and "Pacific Radio News" have done. We have advised you quickly and effectively, and REAL danger was in sight. But not now—the bill will never be made a law—thanks to the many of you who have done such good work in giving it the axe.

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"Pacific Radio News" is a member of the National Association of Radio Dealers.

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

ONE-HALF KILOWATT PANEL TYPE TRANSMITTER

By O. SCHUWENDT

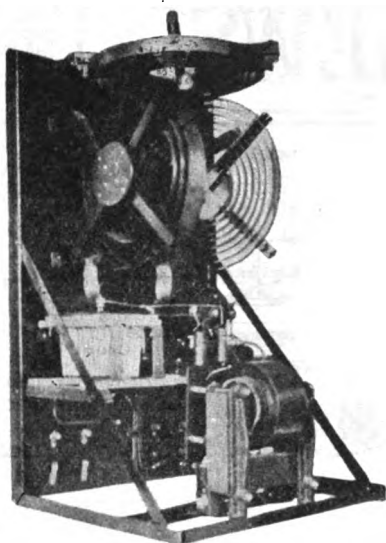


Fig. 2

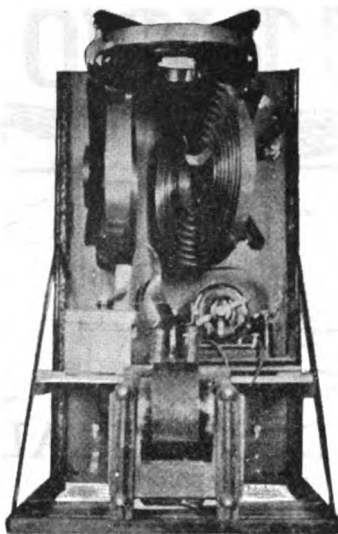


Fig. 3

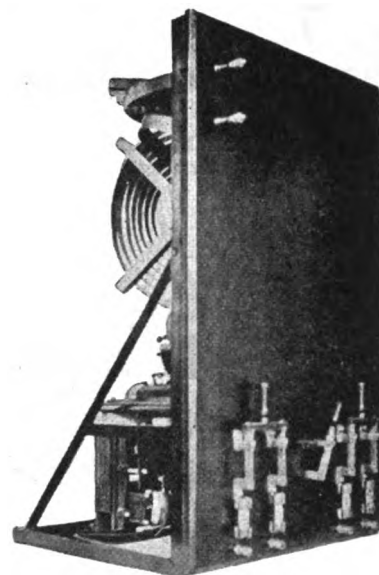


Fig. 1

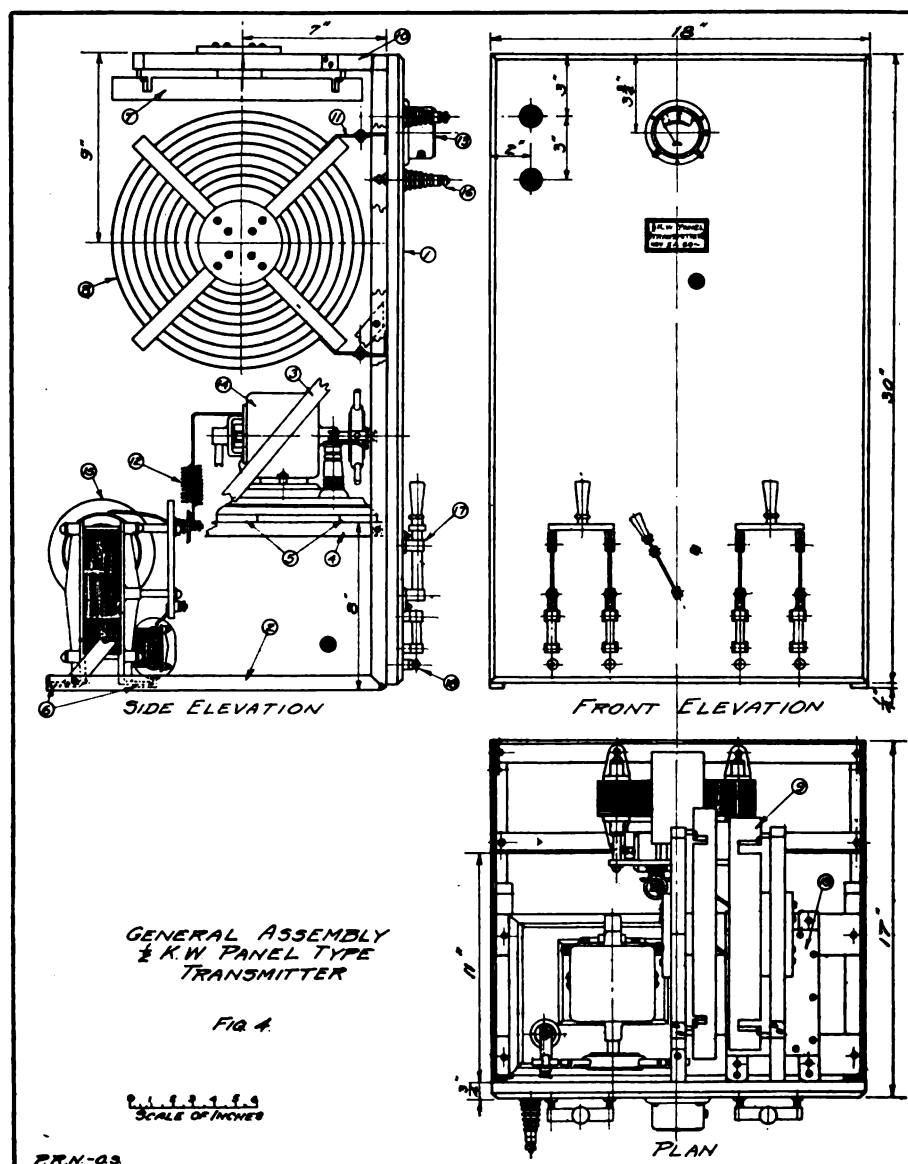
(Drawings by the Author)



HE panel type transmitter to be described has actually been constructed and, although it has not been used to any great extent, it has been found to give very satisfactory service. Fig. 1 is a half-tone showing the front view of the completed set, while Fig. 2 and Fig. 3 are half-tones showing the side and back views respectively. Although definite makes and sizes of instruments are shown there is no reason why other types might not be substituted with slight changes in dimensions to conform to any difference in sizes of instruments if necessary. In the particular set constructed by the writer the following instruments were used: $\frac{1}{2}$ K.W. Acme transformer, Murdock rotary gap with every other stud cut out, giving only six studs, permitting the gap to be run at high speed resulting in better quenching without raising the tone to an excessively high pitch, a Dubilier mica condenser, a home-made oscillation transformer and antenna loading inductance.

Fig. 4 is a drawing showing the general assembly of the transmitter and will serve to make clear certain points that might not readily be seen in the photographs. It will be noticed that a hot-wire ammeter is shown in the drawings which was not in place when the photograph, Fig. 1, was taken. This will fill up the blank space on the panel and make it look much neater.

With reference to Fig. 4, 15 is the Acme transformer, 14 is the Murdock rotary gap, 19 is the Dubilier condenser, 8 is the secondary and 9 is the primary of the oscillation transformer, 7 is the antenna loading inductance, while 12 is high frequency choke coils to prevent surges from the condenser from backing up into the secondary of the transformer. The fused switch on the right of the panel controls the main power line to the set. When the switch is open the panel wiring is dead. The switch on the left controls the rotary gap motor, while the switch in the center is designed to rotate between the two clips and is used to vary the power input



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to the transformer. In case the transformer which the builder intends to use has more than two taps on the primary, more switch jaws can be added and thus all of the different powers can be obtained directly from the front of the panel without changing any wiring. The binding posts below the power switch are for connecting the power leads to the set while the other two are for connections to the key.

In the plan view the antenna leading inductance has been left out in order that the drawings would not be confusing. Wiring has been omitted from all other views. 13 is a hot-wire ammeter which can be of any make that the builder desires to use. The two connections for aerial and ground, 16, may be either in the form of composition posts as shown or large binding posts can be used to advantage.

In starting the construction of this panel set the builder should first make the panel (1) in Fig. 4. This can be of slate or Bakelite, but wood can be used just as well as no high tension leads are run directly on the panel. In the writer's case the panel was made of wood which was first painted with lamp black and turpentine and given several coats of good varnish. Each coat of varnish was rubbed down with steel wool to give a smooth finish before the next coat was applied. The last coat was rubbed down with steel wool and then with pumice stone and water until a dull finish was obtained which greatly resembles grained Bakelite. The terminals and ammeter should be put in the position indicated by the dimensions given in the drawing. No definite dimensions can be given for the location of the switches as they will vary in each case; however, care should be taken to have the terminals of the top clips $7\frac{1}{2}$ inches or less from the bottom of the panel as it is intended to keep all 110-volt wiring below the shelf on which the rotary gap and condenser rest and incidentally from the high tension circuit.

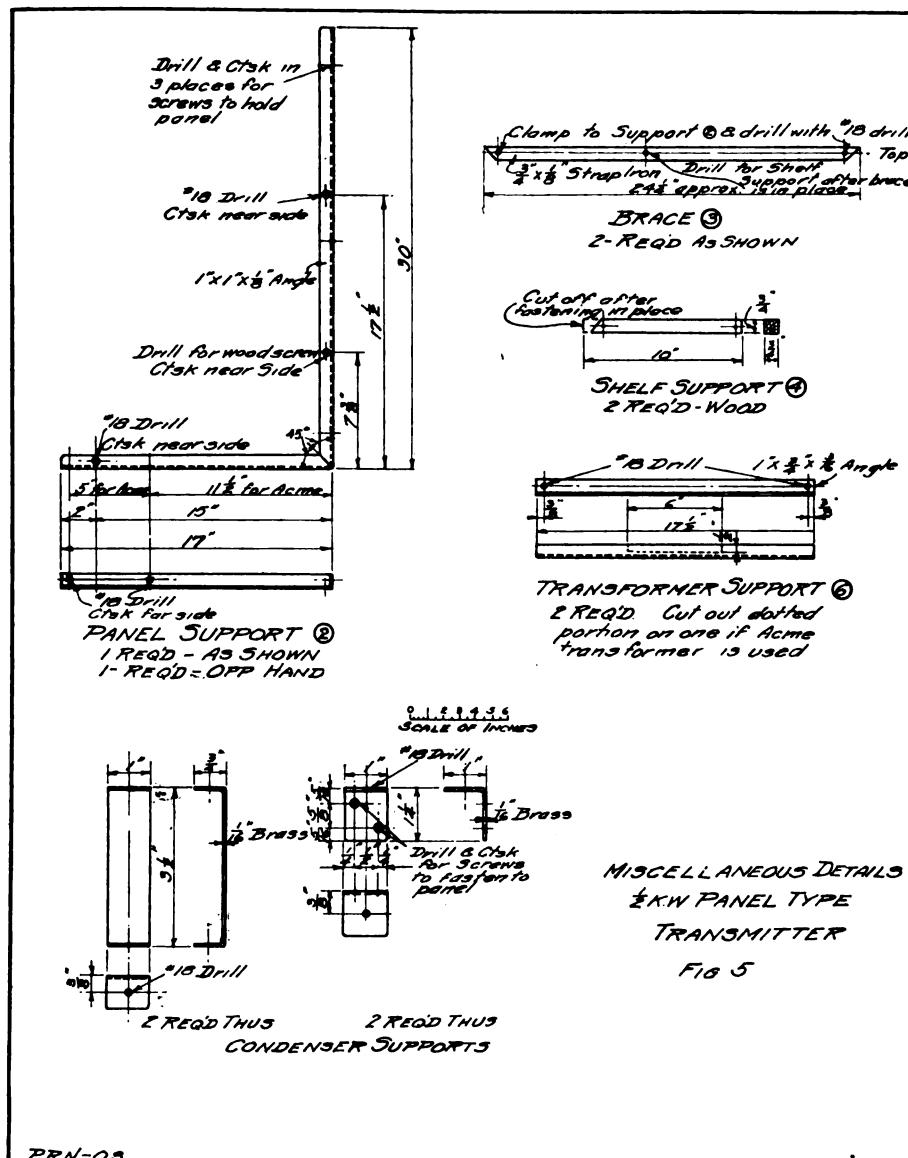
The next step is to make the frame work of angle and strap iron as shown in Fig. 5. The panel supports (2) should be made first. These are made from one-inch by one-inch by one-eighth inch angle iron. The right angle bend is made by making a cut with a hacksaw 45 degrees on either side of a vertical line, 17 inches from one end of the angle iron. The angle can easily be bent cold although it is better to heat it red hot before bending, which would allow the joint to be hammered together to make a neater job. Care should be taken in making the supports to be sure that the notch is cut out just the opposite in one from the other, or the piece of angle iron will be ruined for use as a support. The holes should be drilled in the places shown by the drawing and those which are marked for countersinking should be countersunk with a $\frac{3}{8}$ -inch drill.

The brace (3) is very simple except for the cutting of the angles for each end. This is probably best accomplished by setting the brace approximately in place on the outside of one of the panel supports and scratching the approximate angle of each end on the surface of the iron. After the ends are cut to the correct angles the braces should be clamped in place on the panel supports and the holes drilled for the fastening screws. The brace should be fastened in place on the inside of the angle of the panel supports by means of 8/32 flat head iron machine screws. After the screws are

in place they should be cut off flush with the face of the nut and the head should also be filed down until it is flush with the sides of the angles. The hole for the shelf support should be drilled after the shelf support has been fastened to the panel support and leveled up. It will be necessary to put a couple of washers on the screw between the angle and the shelf support to bring it out even with the brace. The shelf support (4) itself will need no description

The supports for the Dubilier condenser are also shown in Fig. 5. They are bent of $\frac{1}{8}$ -inch thick brass in the shapes shown in the drawing. The two small angles are screwed on to the back of the panel while the two long supports are screwed to the shelf (5), which consists of two strips of wood $\frac{3}{4}$ -inch thick by 2 inches wide and $17\frac{1}{2}$ inches long, screwed to the shelf supports (4).

The antenna loading inductance (7), oscillation transformer secondary (8),



as it is merely a piece of wood $\frac{3}{4}$ -inch square, the bevel being cut after it is fastened in place.

The transformer supports (6) are made up of $\frac{3}{4}$ by 1 inch by $\frac{1}{8}$ -inch angle iron in lengths as shown in Fig. 5. The holes drilled in each end are for fastening bolts which are countersunk on the under side of the panel supports. 8/32 machine screws are used here as on the braces. If an Acme transformer is used it will be necessary to cut out a portion $\frac{1}{2}$ -inch by 6 inches from the forward angle to clear the reactance coils. Holes are drilled for fastening the transformer to these angles, matching them up with the holes in the feet of the transformer. The transformer is fastened in place with iron machine screws coming up from below and with countersunk heads.

and primary (9), are shown in the drawing, Fig. 6. Although the antenna loading inductance is not altogether necessary, in most cases the writer would advise its use as it is useful in tuning the set. On small aeriels it is almost a necessity.

The cross pieces are made of wood $\frac{3}{4}$ -inch square and of the length shown in the drawing. The two pieces are set into each other to make a flush joint. The circular piece on the back of each inductance is fastened in place with two wood screws in each cross piece as can be seen in Fig. 4, serving to strengthen the unit. A novel method of supporting the copper strip is used. It consists of using small lengths of $\frac{1}{4}$ -inch thick Bakelite, set edgewise, with slots cut for the strip and a step cut in each end for the

screw to hold it to the cross piece. This method represents quite a material saving over using a solid piece of Bakelite for the insulation of the copper strip and also makes a neat form of support.

For the primary the Bakelite strip is 1½-inches wide and the steps are cut as shown in the drawing. The primary is wound with a double thickness of 26 gauge copper, 1½-inches wide, with a piece of shellaced paper between the two, and the slots in the Bakelite strips

more slot than the other three, thus making one with nine slots and three with eight slots each, for each inductance. The secondary will require about twenty feet of copper strip and the loader will require the same amount.

The angle supports to fasten the loader and primary to the panel are identical in construction and are bent from $\frac{1}{2}$ -inch thick brass to the dimensions shown in Fig. 6. Little difficulty should be experienced in making these.

gage with the above gear and rotation of the secondary would take place by turning the knob.

All high frequency connections are made with 26 gauge copper ribbon, one inch wide, and are soldered wherever possible. In the case of the writer's set, the primary was tuned to exactly 200 meters with a wavemeter and the closed circuit leads then soldered in place. The high frequency choke coils (12) are made of ten turns of number 10 bare copper wire, one-inch in diameter, and the ends bent over to the condenser terminals. A switch with a removable blade should be provided on the rear of the panel for shortening the ammeter when it is not in actual use.

Although the writer does not expect the above set to be exactly duplicated, he does believe that the description will give the prospective builder of a panel transmitter a number of ideas on making up a very efficient type of set.

AVALON PHONE HEARD 6000 MILES

THE radiophone of the Pac. Tel. & Tel. Co., between Avalon and Long Beach, Calif., has broken the world's record, it is believed. It is understood that several British naval ships, while lying in the harbor at Auckland, New Zealand, have repeatedly tuned in, and listened to the telephone conversation between Long Beach and Avalon, and that in most cases but little trouble was experienced in understanding everything spoken over the phone circuit. This distance is approximately 6,000 miles, all over water, it is true, but is believed to establish a new distance record for telephony. The most remarkable part of the feat is that the transmitting apparatus was only putting 100 watts into the antenna.

VALUABLE GALENA AND SILICON ORE FOUND IN CALIF.

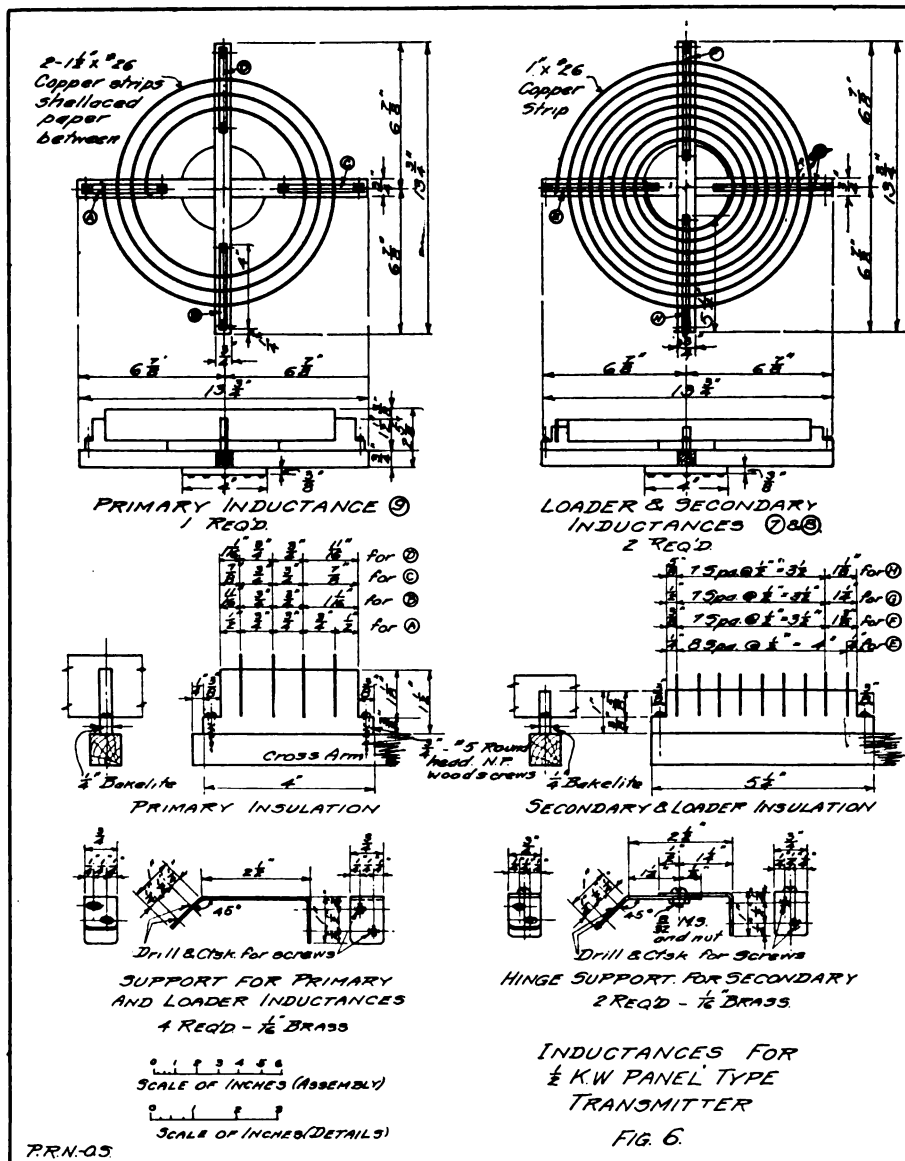
MR. E. H. Heintze, an operator of the Western Union Telegraph Company and formerly a commercial radio man, has made an unusual find in the mountains near Needles, California. Many tons of supersensitive galena and silicon have been unearthed and made ready for the radio market.

Sample crystals were tested by the publishers of Pacific Radio News and found to be the best detecting minerals of any yet known.

Amrad Quenched Gap Relay

THE American Radio and Research Corporation has established a chain of relay stations extending from the Atlantic to the Pacific. Only stations using the Amrad Quenched Gap are included in the chain. Test messages are to be sent every Tuesday morning throughout the month of February. The first message was dispatched several weeks ago and reached the Pacific Coast without difficulty and in good time.

MR. and Mrs. Albrecht J. Scheuerlein announce the marriage of their daughter, Stephanie, to Mr. Alfred Henry Grebe, on Saturday, the eighth of January, 1921, Philadelphia, Pa.



should be cut just wide enough to allow the strip to be forced into them. It should be observed that the support at the beginning of the winding has four slots while the other three have only three slots each. It might be stated here that the primary will require approximately sixteen feet of ribbon in all.

The secondary and loader insulation strips are made in a somewhat similar manner to the primary except that they are only one inch wide and are longer, as can be seen by the drawings. The secondary is wound with a single thickness of 26 gauge copper strip, one-inch wide, and the slots in the Bakelite should be cut of such width that the winding can just be forced into them with the hands. It should be noticed here also that the insulation strip on which the winding starts and ends has one

The hinge or pivot supports for the secondary are made in two pieces and have a machine screw through them to act as a pivot so that the secondary may be swung through an angle to vary the coupling. The machine screws are tightened up just enough to make the hinge or pivot bind slightly when turning the secondary. This will be found to be a very effective method of coupling adjustment and the secondary will hold its adjustment indefinitely. The builder can use his ingenuity in devising a means for adjusting the coupling from the front of the panel. This may take the form of a small bevel gear fastened to the part of the lower pivot which is attached to the cross arm of the secondary. Another bevel gear, fastened on a shaft extending through the panel and having a knob attached to it, would en-

IS AMATEUR RADIO DIGGING ITS OWN GRAVE?

Timely consideration of a matter which seems to have been given little or no attention and may foreshadow disaster for the honest experimenter.

By ARTHUR H. LYNCH

EXPERIMENTERS have proven before, during and after the war, that a very great portion of the advance made in radio engineering and operating may be traced directly back to them when its origin is sought. The accomplishments of former amateurs, in the service of the army, navy or other departments during the war, have been so completely chronicled that there would be but little use in reviewing them here in any but a very summary manner.

The vacuum tube really was more of an experimental than practical nature before its general adoption and application to wartime use by the various military forces throughout the world. Many American amateurs assisted in a great measure in making the change. To rehearse the wonders of the V. T. for the unlimited uses to which it may be applied would take volumes. Suffice it to recall that it is the little tube which makes possible the reception of signals which were inaudible before its development: it makes possible the transmission of signals or voice with comparatively small power consumption for the covering of great distances. By its use, it is possible for airplane pilots to communicate with flying fields while several miles above the earth. And so it goes, ad infinitum. This one little glass bulb with its glowing filament, metal plate and twisted gird, forming the battleground for the opposing hosts composed of myriad electrons, has proven such a wonderful aid in the promotion of human intercourse and world progress that even where we are crowded for space we cannot fail to eulogize this most wonderful achievement of the "radio brain." In tracing this invention to its source a great deal of trouble would be experienced if the desire was to give an individual credit for its evolution, or even its origin, but regardless of the actual person responsible for it, it is generally agreed that the present-day V. T. was an AMATEUR DEVELOPMENT.

And, in like manner, from the first experiment of Marconi through the ever-increasing field of usefulness of the V. T. to the Alexanderson alternator and the radio control of a crewless battleship, we find that a vast amount of constructive work has been done by the AMATEUR.

This wonderful discovery—radio—is being applied in a most intricate and systematic manner. Because of its inherent weaknesses, it is best suited for the furthering of world-wide intercommunication, when certain regulations for its employment are followed. In the early history of radio, such regulation was hardly necessary because of the small number of stations, but today, with antennae proudly standing above vast numbers of homes throughout our country, all having something to say to an antenna one, two or three thousand miles away, traffic regulation is a very serious matter.

For the framing of the rules for the governing of radio traffic, the legislators of most governments find time to take their minds from the most important affairs. Our own government is, to a very marked degree, much more lenient in the matter of Amateur Radio regulation than any of the others. In this country the all-important work, which has al-

ready been accomplished and has had for its sponsor some experimenter, is remembered when the regulations are being made. But even in this appreciative country of ours, there are certain fixed limits for this experimentation.

Radio Clubs of Great Assistance

Realizing the need of co-operating with our government in this regard, many organizations have sprung up, which strive to make amateur traffic all that it should be. They have done a vast amount of good. In the up-to-the-minute amateur station radio traffic is handled equally as well as in the higher class commercial stations. There are many conscientious and earnest workers throughout the country who are doing all in their power for the promotion of the art. They painstakingly experiment with various circuits, in an effort to produce the best; they burn the midnight oil in efforts to improve design, or they labor tediously over the writing of a paper to be read before their club, and all in an effort to make radio a cleaner, better, more efficient and more interesting art.

But, in their work, they are hampered very materially by several very distinct and equally annoying varieties of a class of individuals, commonly called "pests."

From your own observation, in the operation of your station, you have come across most of these varieties, or, to be more accurate, they have come across you.

The number of those who refuse to be governed is by no means negligible—in fact, it is surprisingly large. It is not confined to the beginner nor the youngster with the small spark coil; its ranks are not limited to those who do not know better; it is made up of a large number of those who are so wantonly selfish and pig-headed and—throw in a few names yourself, Dear Reader, and make them as strong as you like.

This flagrant disregarding of the law, and in many instances common decency, is increasing with the growth in the number of stations, though statistics indicate that the latter increase is proportionally greater than the former. A very good thing, but one which is not being propagated rapidly enough.

And, strange to say, there has been but very slight objection raised by the government. Does that fact mean anything to the deeper thinking Radio Amateur? Does it not appear to be strange that the law may be so unceremoniously broken, with no penalties being meted out to the breakers? Is the Radio Service of the Department of Commerce going to go on paying no attention to those amateurs who take delight in interfering not only with the traffic of other amateurs, but also with commercial and even government communication?

Is the Day of Reckoning Coming?

It is quite unlikely that this repose, if that is the way you would care to have it classified, will continue indefinitely. It is as nearly certain a fact as that you are alive, that some of these fine days—or bad days—there is going to be a show down, and like the day of judgment, we know not when it will arrive.

The reason Amateur Radio has been given consideration in this country is because it is recognized as a lively source for the promotion of the art, not

because it happens to be somebody's hobby. When the amount of work done for the betterment of the science is approached by the amount of damage done the same science, the experimenting is going to be cut out. Our government has not been backward, in the past, in the enforcing of the greater part of its laws, and there is every reason to believe that it will clamp the lid down on Radio, unless some steps are taken rapidly to reduce the utter disregard and even contempt with which they are greeted in some quarters.

Is Radio on Trial for Its Life?

It would seem so. Correspondence, via the ether, if that is the medium which carries radiotelegraphic messages, is subject to eavesdropping. Those entries which you have in your own log-books may be duplicated in a large number of stations. They may even be part of an official and secret log being kept by government men, whose duty it is to run down the breakers of the communication laws. What is to prevent identical copies being made at the various navy yards of these and similar cases? By the application of the "Law of Averages," which is the fundamental basis of all just laws, it would seem as though Radio may be taken before the court and ordered to give an account of its stewardship.

Most amateurs are familiar with the fact that legislation was attempted, not so very long ago, which would have just about put a crimp in the art which is furnishing instruction and pleasure for thousands of young Americans. The main factors in the pushing of such legislation have not gone and found a nice quiet place and died there. Most certainly not! Like the government, they may be piling up their data and instead of getting after the individual transgressor and making him pay the penalty, they will bring a compilation of statistics before the law-makers, so conclusive in its statements of actual lawlessness, as to be strong enough to bring down the governmental wrath upon Amateur Radio's head, in the form of very drastic measures, which will effect not only the actual offenders, but the entire Amateur Fraternity.

There appears to be something subtle in the Department's apparent blindness. Is Amateur Radio to be such a fool as to allow such a condition to be brought about? It's up to you. Think it over.

BOOK REVIEW

Revolutionary Theories in Wireless

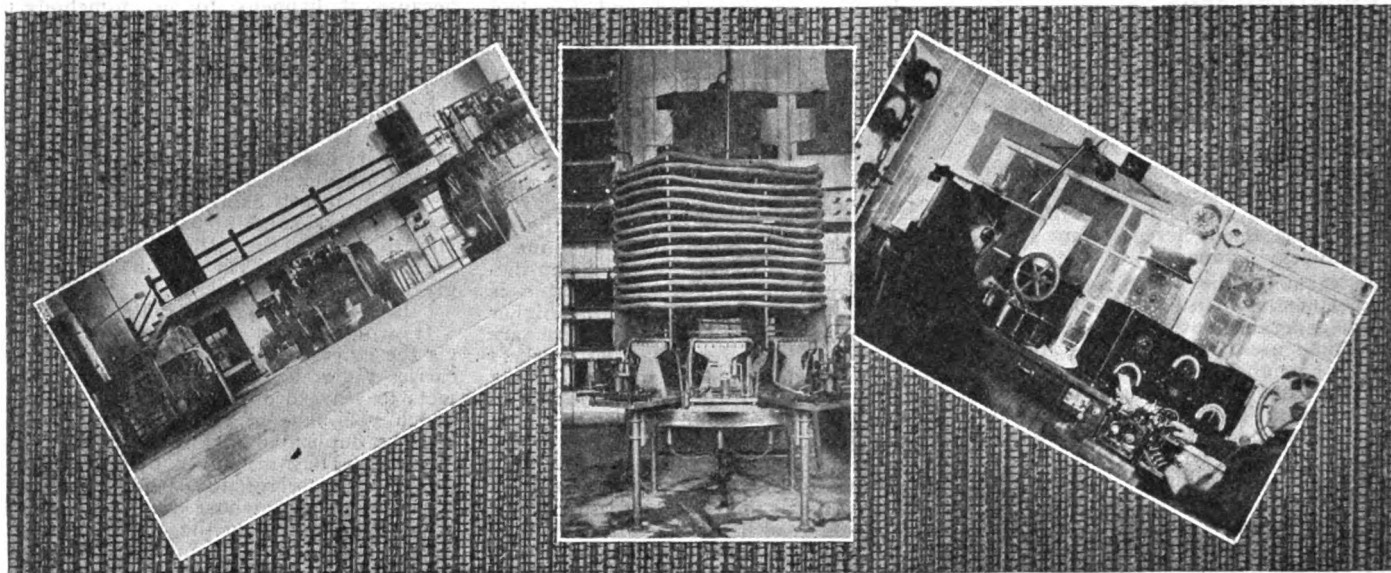
DESCRIBING in a new and heretofore unpublished manner the operation of radio stations. Present day theories disputed and treated fully in an entirely different angle. Interesting from cover to cover. 200 pages. 72 illustrations and 129 articles. Cloth bound. \$2.50 per copy. Author, Frank E. Summers, Memphis, Mo.

Simple Description of Radio Telephony

PUBLISHED in blue-print form. Covers radio telephone subjects in a simple manner. Several good diagrams and many simple explanations. Prepared by F. A. Stainbrook. Published by Forest Publishing Co., Boston, Mass. Price, 50 cents per copy, postpaid. Copies can be secured from the publishers of Pacific Radio News.

THE U. S. NAVAL SIBERIAN EXPEDITION

By H. L. Rodman



THE U. S. S. "Saturn", in command of Lieutenant Commander Frank H. Luckie, U. S. Navy, put out of San Francisco in November nineteen eighteen with a heavy load of machinery, apparatus and supplies, bound for Vladivostok, Siberia, via Honolulu, for the purpose of erecting and installing a 60 K. W. arc radio station.

After a trying passage, during which some very severe weather was encountered, the "Saturn" arrived in Vladivostok harbor in January, nineteen nineteen. Ice had already formed across the lower harbor and it was necessary for an ice-breaker to precede the "Saturn" up the Golden Horn.

Pospeloff Point, near the American Red Cross hospital on Russian Island, was selected as a base from which operations would be carried on, this being at the time the nearest accessible point to the station.

While the thermometer was dropping, the "Saturn" was maneuvered through the ice as close to shore as possible, her entire length jammed well into the ice through the channel cut by her nose, and allowed to freeze in.

The "Saturn's" cargo was then worked ashore over the ice, both man-power automobile being used to pull the sleds. The average thickness of the ice was approximately eighteen inches, but due to packing, the actual thickness of supporting ice grew to three and four feet.

The surface of the pack-ice was very rough and it was necessary to chop a trail in some places to allow the sleds to move smoothly.

A five-ton truck was lowered on the ice and towed ashore without difficulty.

The unloading of the "Saturn" was carried on in intensely cold weather, from 20 to 30 below zero, but notwithstanding this fact, our own men stood the cold better than some of the natives.

The operation of getting all material and supplies ashore on Russian Island completed, the "Saturn" departed, leaving the expedition to commence what later proved to be the real work.

Officers, enlisted men and navy yard employees totalling about forty, and this

expedition was calculated to be self-sustaining for six months. A Marine guard of twelve men was added later.

The American Red Cross hospital graciously tendered the use of one of their buildings for living quarters while the expedition was operating from the Pospeloff base.

All material had now to be trucked nine miles to the station over a road partly over land and partly across the ice on Novik Bay, which nearly divides Russian Island into two separate parts.

Now and then one wheel of a heavily loaded truck would crack the ice and let water through, but by keeping the trucks moving, practically all material was transported from the base to the station over this route. The only other road leading to the station was eighteen miles long. The road across the ice cut the distance in half.

A great deal of hard work was encountered in keeping the roads clear of snow drifts. Indeed, it is doubtful if a radio station was ever before constructed where so many difficulties in the way of natural obstacles were encountered. At times the task looked almost hopeless, but the station was needed for war purposes as soon as it could be completed.

Fortunately, the personnel of the expedition had been especially selected as to physical fitness and other qualifications, and for the most part they were a stout hearted crew. There were times when they plugged on through the most discouraging adverse circumstances. For one thing, it was very difficult to keep the motors running properly, and the truck crews never knew when they would be stalled on the road and forced to walk miles in the piercing North wind.

The station itself had been started by the Russians but never completed. They had planned a high power station capable of communicating with Petrograd on one side and San Francisco on the other. Eleven towers, each 100 meters high, had been erected, and two good stone buildings completed. Many other buildings had been planned, the foundations for some having been laid. It is safe to say that had the Russians carried out their project, it would have been by far the largest radio station in the

world, although it would not have been as powerful as the Annapolis, La Fayette or Nauen stations. The Telefunken system was to have been utilized, the prime movers being two 400 H. P. Deisel engines burning crude oil, one of which with the exception of a few parts, was found at the station. Even a special dock in the adjoining bay and a portable railroad had been built and laid by the Russians, all of which was utilized by the American expedition.

Three 100 meter towers forming a triangle approximately 900x700x600 feet were utilized for suspending the triangular flat-top antenna for the 60 K. W. arc. Number three hard drawn solid copper wire was used for each of the antenna wires. Five wires on 30 foot channel iron spreaders were used in each section of the triangular flat-top, the down lead being taken conveniently from the intersection where the 900 and 700 foot sides of the triangle came together.

A small antenna, similar to a ship's antenna, was also put up between two of the towers supporting the main antenna, at about 100 feet from the top, for the 12 K. W. auxiliary arc set.

A large room on the mezzanine floor of the main building was remodeled for use as arc and operating room. Other rooms on the mezzanine at the opposite end of the power house were equipped and used as officer's living quarters, another building having been given over to all other personnel for this purpose.

The main large room on the ground floor was used as a power house, as was originally planned by the Russians.

A 150 H. P. Fairbanks Morse gas engine was installed to drive a 65 K. W. generator which in turn provided current for the main arc set.

A 60 H. P. Union gas engine, driving two 12 K. W. generators was installed for the auxiliary arc set.

A still smaller set of 7½ H. P. was installed with a 5 K. W. 110-volt generator to provide lights and auxiliary power.

Fuel tanks, storing eight thousand gallons of gasoline and distillate, were erected on platforms outside the power (Continued on page 270)

WASHINGTON'S BIRTHDAY RELAY

A 30-WORD message has been received from Senator Harding, our new President-elect. The idea of the relay is to deliver this message to either the Governor of your state, mayor of your city or your Congressman or City Councilman or other city authority. State Senators or U. S. Senators are included in the list. The main idea is to deliver this message to as many City County, State and National officials as possible.

English amateurs have my permission to deliver this message direct to H. R. H. The King of England—and if they get the message—Go to it. Foreign amateurs in other countries may deliver the message and get the same credit as a local amateur, with a shade of advantage for a prize owing to distance covered. This includes Canada, Porto Rico, Mexico, Cuba, Iceland, Hawaii and as far as it will go. If there is any trouble with message not going through on the night of February 21, 1921, it will be run the next night, February 22 at the same time. A great many amateurs have their Club or Association message blanks and one of these must be used for the message to be delivered to the above authorities—reading the message to them and getting their receipt; as well as time received and delivered being plainly noted on the message blank, together with your name and address and call letter, if any. Also state from what stations you received the message. Then this receipted message must be mailed at once to W. Kirwan, Box 148, Davenport, Iowa. All your names will be listed in all the Wireless Magazines that are sufficiently interested in this relay and yourself, to publish them. There are thousands of dollars worth of prizes; from a watch to a two-step amplifier and all from the best dealers and advertisers in the business. Prizes will be held by these many companies until the prize winners are announced and they will then ship you your prize after name is published in magazine. The names of firms donating prizes will also be published shortly. You can easily win a prize and there will be lots to go around. It costs nothing to enter the contest and no matter what Club or Association you belong to—your are welcome. Thousands of amateurs belonging to the N. A. W. A., Radio League of America and numerous Radio Clubs, Y. M. C. A., Boy Scouts, Knights of Columbus, together with the many members of the A. R. R. L. will compete in a good natured National Contest for superiority in receiving and the result will no doubt discover many new efficient receiving stations that will need only a little brushing up to make them good long distance relay workers.

First thing you do when you receive this letter is to give it to your local newspaper and state approximately the number of amateurs that will be listening in, also the names and addresses of nearest sending station. Then locate the man you intend to deliver the message to and hang on his trail until you deliver it.

Time of Starting

8:10 P. M.—Eastern Standard time, February 21st.

8:10 P. M.—Pacific Standard time, February 21st.

Message will be 30 words.

14 words come from Atlantic.

14 words comes from Pacific.

2 words comes from Station 9 BY, at Rock Island, Illinois, alongside the Mis-

The following prizes will be awarded to the winners of the contest.

Q.S.T.	5	1 year subscriptions
Radio Topics	1	2 year subscription
Pacific Radio News	10	1 year subscriptions
Clapp-Eastham Co., Cambridge, Mass.	1	ZRF Receiver.....\$38.00
Karlowa Radio Corp., Rock Island, Ill.	1	CW 20 Gap.....20.00
Thordarson Elec. Co., Chicago, Ill.	1	RS. ¼ KVA Trans.....30.00
Montgomery Ward Co., Chicago, Ill.	1	2-step Amplifier.....28.00
Signal Mfg. Co., Menominee, Mich.	1	R37 Receiver.....37.50
Wireless Mfg. Co., Canton, Ohio	1	NSR Gap.....50.00
Illinois Watch Co., Springfield, Ill.	1	Watch.....50.00
Chicago Radio Lab., Chicago, Ill.	1	Zenith Tuner.....65.00
Wilcox Lab., Lansing, Mich.	1	14A Gap.....10.00
John Firth & Co., New York, N. Y.	5	prs. Brownlee Phones.....80.00
John Firth & Co., New York, N. Y.	5	Meters (advance).....50.00
Radio Corp. of America, New York, N. Y.	6	UV 200 Bulbs.....30.00
Sears Roebuck Co., Chicago, Ill.	1	Regenerative Tuner.....40.00
and if a lady wins the prize she can have the choice of a good baby carriage—others still coming in.		
Tresco—1 20,000 M Tuner, \$10.00 Prize.		

issippi river. This makes it fair and equal to all the United States—but a disadvantage for the foreign stations—a point the prize committee will remember. In case of Static or other severe interference relay will be run same time night of February 22nd.

Interference

Of course, if you send unnecessarily during these times you merely hurt your local friends who may be listening in.

Stations throughout the U. S. will send information on a Q.S.T. starting February 1, each night, some by phone. C.W. and spark, about this relay and this will be a good chance for you to acquaint yourself with sending stations and tune your step up.

U. S. Government Station N. S. F.

Anacostia D. C. will send information during weeks after February 1st on 250 meters and will Q. S. T. the complete M. S. G. as soon as it is received by them 10 minutes after the hour, through 8 XK and 9 BY. These stations will use C.W. and Wireless Telephone and you will be a good listener when you get through. 8 XK will send out information starting first week of February 1st—at night both by telephone and C.W. Mr. F. Conrad of Pittsburgh, Pa., is the operator who is going to try and help you—so co-operate with him.

Station 9 BY—Rock Island, Ill., will use 200 meters C.W. and phone, starting in nights of first week of February to send out information about relay. Mr. R. Karlowa is owner of station and would ask you to report his signals.

Station 9 ZN Chicago—Mr. R. H. Mathews will also send out information during February about the relay. Also all Z stations in country affiliated with the American Radio Relay League of Hartford, Connecticut.

Reason For Relay

1st. To start a keen, good natured rivalry between the many amateurs of the United States and Canada who have made some wonderful claims on receiving.

2nd. For the good of the game to give a big event once a year and give the boys who cannot do long distance work a chance to do some real long distance receiving and an incentive to better their stations if it is possible.

3rd. So that all may join in one grand big picnic once a year and enjoy some real sport as this will be the biggest wireless event of years, something to discuss and talk about for a long time.

4th. To show our new President-elect what we can do, and in event of any unfavorable future legislation—we will at

least have all those we deliver message to as an ally.

5th. To stimulate interest in amateur wireless throughout the world.

Message

The 14 words coming from the Atlantic through the following sending stations will be the 1st, 3rd, 5th, etc., of the message.

The 14 words coming from the Pacific will be the 2nd, 4th, 6th, etc., of the M. S. G. and the last two words of the message will be started by 9 BY, at 9 P. M., central time on a Q.S.T.—three times only—200 meters—also by 8 XK and N.S.F. on 250 meters as soon as they get these two words from 9 B.Y. Preferably 10 minutes after the hour, at 10:10 P. M., 11:10 P. M., 12:10 P. M., etc. As much of message will be sent by these two stations as has been received. Station 9 ZN will also repeat M.S.G. three times on Q.S.T. as soon as received on 425 meters on the hour and half hour, but he will send on 200 meters in relay. This will give you a chance to check up in case of interference on 200 M. The signature of the M.S.G. will be given you here as Senator Harding, Marion, Ohio; and this will not come over wireless—just write it down now and piece the rest of the M.S.G. together when you get it.

Caution—Warning

Sending stations please have a heart for us amateurs and do not send over 10 words per minute rate, no punctuation or fancy flourishes or singing more than three times. With the class of sending stations of the A.R.R.L. in this relay this request is superfluous, but is for the benefit of the listening amateurs.

The amateur sending stations will set an example for the fellow who try to gum up any game, good or bad, and they of course will be out on this night, but as a rule, their spark is in their own neighborhood and offenders of this class are handled locally. From the amount of labor expended by all hands helping in this relay there is no sensible reason for there being any interference except wilful, and full arrangements have been made to list this kind of Q.R.M.

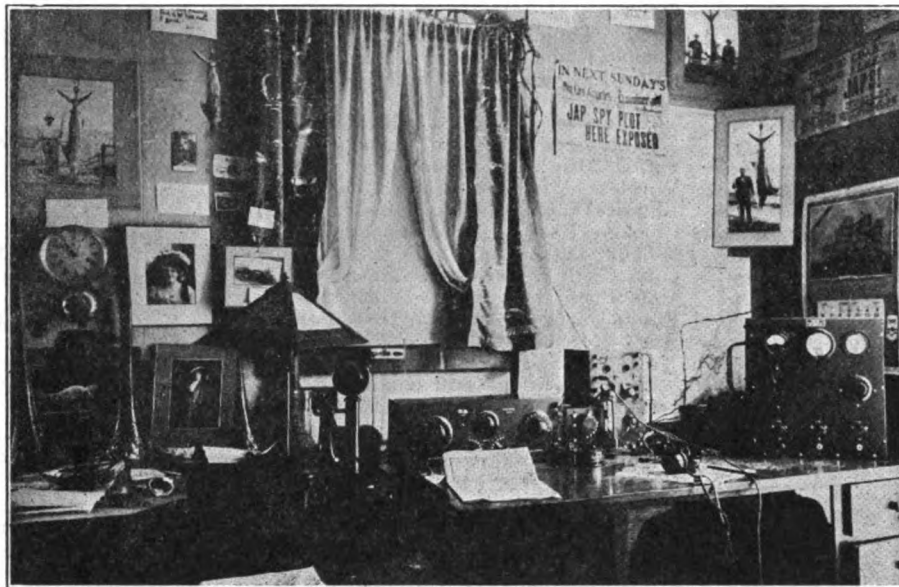
Don't copy M.S.G. from newspapers as purposely the Associated Press will get M.S.G. without two words. Pass this circular around—read it before your radio friends and get ready for the big event.

Sending Stations

All the best sending stations of the A.R.R.L. on the routes in use will send on this night and the A.R.R.L. should (Continued on page 262)

* * * "6BX"—AVALON, CATALINA ISLAND * * *

One of the most complete and up-to-date radio stations on the Pacific Coast is the one at Avalon, Cal. Radio telephone and C. W. transmission is used exclusively. One of Mr. Mott's pet hobbies is fishing. He is the author of several books and many of his writings appear in our large national publications.



The radio telephone used by 6BX was heard in Arizona and by amateurs in the Seventh District. A Montana amateur reports loud signals from 6BX. A Grebe long wave receiver and another two step amplifier will be installed in the near future.

Photo by Reyes, Avalon, Catalina Island.

THE photograph of Mr. Mott's station—6BX—at Avalon, Catalina Island, California, shows his apparatus so clearly that but little explanation is necessary. At the extreme right is his especially designed and constructed tube transmitter, in which he uses three tubes. He derives his power from the city current—110 volts—through a special transformer, and gets the exceedingly good results of from $1\frac{1}{2}$ to 2 amperes in the antenna. The one trouble that he is experiencing is caused by the fluctuating of the city power, that he compelled him to have built three especial circuit breakers in order to safeguard the tubes. The

receiver is the Grebe, short-wave regenerative model, used in connection with an Audiotron detector set, and a two-step Grebe amplifier above it. The sending key is just behind the Baldwin phones on the table. Mr. Mott also employs a 9-plate tuning condenser between the receiver and the detector. He reports most satisfactory results, this arrangement permitting of very sharp tuning.

He has been reported as QSA from stations in the Seventh and Fifth Districts. Three wave lengths are arranged for—200, 220 and 235—all very sharp-drawn. So sharp indeed is his transmitting wave that he asks those who

would listen for him to tune exactly on 200 meters, as if this is not done listeners' sets will not oscillate and a "mush" sound will result, whereas if they are tuned correctly they will hear a very fine, resonant note, easily readable through almost any QRM.

Mr. Mott is installing a Grebe long-wave, regenerative receiver with another two-step amplifier in connection with it, and another set of Baldwin phones. When 6BX is in full commission it will be as up-to-the-minute a station as there is on the Coast, and he hopes to broadcast his fishing news in such a way—o' summer evenings—that listeners far and near will be interested and entertained.

FROM OCEAN TO OCEAN

By Lawrence Mott (6BX)

WHEN radio, plus land lines, work together with such cohesion and so efficiently, that at my amateur station at Avalon, Catalina Island, California, I heard—remarkably QSA—voices speaking from the S. S. "Gloucester"—out at sea off Cape Cod, the Massachusetts coast—to the Pebble Beach station of the commercial wireless telephone between the Island and the mainland—American brains, constructive ingenuity and invention have shown the stuff of which they are made!

And furthermore—the voices of the operators assisting at the carrying out

of this feat, and stationed along the line, came in to me as clearly as though they were but across the way. N. Y., Boston, etc., all the long miles to Fresno, San Francisco and then Los Angeles, were plainly audible with excellent modulation and fine tone.

On the "Gloucester" they were transmitting on 365 metres, and receiving on 410. At Pebble Beach transmitting was effected on 400 and reception on 470.

I was listening-in on my Grebe regenerative receivers, using the regulation, amateur antenna—and I needed no

amplification to hear the voices on the ship on the Atlantic at all. The reason for this was, of course, that I was chiefly receiving through re-radiation from the Pebble Beach station's aerials—that are situated about a mile and a half from my own.

I am informed on the highest of radio authority that the British battleships, while lying in an Australian port—but lately—heard wireless conversation between Avalon and the mainland with great clearness—and that is a distance of more than 6000 miles!

'Nuff sed!

BRITISH TRY TO BALK WIRELESS IN CHINA

An international dispute, with Japan, England and Denmark lined up on one side, America on the other and China in the middle, has arisen over a contract granted by China to the Federal Telegraph Company, a wireless company with headquarters in San Francisco.

Big issues are at stake, including America's future commerce with China, in the opinion of American officials.

Japan and England have demanded of China the revocation of the contract, which calls for the construction of a

radio plant at Shanghai. Denmark has made a separate demand to similar purport. America is seeking delay.

Officials in East

R. P. Schwerin, president of Federal Telegraph, is now in Washington. It was reported his visit had to do with the Chinese row. Hiram W. Johnson, Jr., a director of the company, is also in the East. Others prominent in the affairs of the company, which was formed in 1911 and has a service extending up and down the Pacific Coast, are T. C.

Tognazzini, August Taylor and Leon Bocqueraz, all prominent in San Francisco's business and financial affairs.

Details of the dispute were brought in an Associated Press cablegram from Peking.

British Pressure

The dispatch said Premier Chun Yun-Peng, under pressure of the British legation, was seriously considering a proposal to cancel the contract of the Federal company with the ministry of com-

(Continued on page 273)

THE FALL OF SAMUEL JONES

By Volney G. Mathison

(Author of "A Bungled Affair," and others.)



SAMUEL JONES has always strenuously opposed the idea of my writing an account of his Great Fall. Once, when I casually mentioned the matter to him, he most emphatically objected, averring that he didn't want to have his private business printed in a magazine and exhibited on all the newstands in the country, to be read and snickered at by the darn public. He declared that the said affair in question occurred many years ago, when, fresh from the turnip-patch and hay-field of a country farm, he was quite unsophisticated and wholly unversed in the deceiving ways of the fair sex; and he said he felt that Evelyn Campbell, the young lady in the case, made quite enough of a jackass out of him at the time, without my rubbing it in by writing a fool story about it. Hence, I was obliged to desist.

However, since just this morning I was casually informed by the radio inspector that Samuel Jones has lately departed on a big freighter, off on a six months' voyage to Madagascar with a cargo of prunes and windmills, I have resolved to take advantage of his absence to slip you the story of his Great Fall.

Once upon a time, in the dim Achaean age of the wireless game when shell-backs were greenhorns and the straight-gap roared supreme, the chunky little steam-schooner "Wapama" pulled away from a San Francisco pier, one cloudy autumn afternoon with a full list of passengers—about twenty—and a cargo of lumber. The cargo had been brought down from the Columbia River, the passengers recruited at San Francisco, and the "Wapama" was bound for San Pedro, where she would be relieved of lumber and landlubbers, alike.

As the good ship rambled out through the Golden Gate, Samuel Jones, the chief wireless operator of the vessel, settled himself at his operating desk, as comfortably as the cramped combined wireless cabin and sleeping room would permit, and resigned himself to the necessity of standing watch until midnight, when he would be relieved by his assistant, Jimmie Morrow. With the phones resting loosely on his tow-headed cranium, he extended a long arm and dragged out a large musty volume from beneath the old-fashioned condenser rack. Hitching his chair around a few times until he was able to wrap his long, lanky legs around the motor generator in a manner to his satisfaction, he hunted for the place in the book where he had read last.

The book, which bore the weighty title, "Thrilling Adventures Among the Red-Headed Wild-Men of Bonga Tonga, by the famous missionary-explorer, Sir Sigmund Athanasius Mugfoot," clearly held a special attraction for Samuel Jones. Scarcely six months away from the adventureless environs of a country farm, he was intensely interested in the account of the perils braved by Sir Sigis-

mund in his invincible determination to convince the cannibals of Bonga Tonga that canned horse-meat was better for the soul than fresh man-chops.

Samuel Jones had fallen into the habit of reading aloud for the benefit of his second operator, when he came to the more thrilling passages in the book. Jimmie Morrow had long since resigned himself to this business, and customarily listened to the stirring accounts of butcheries and battles with a callous indifference. Jimmie's main ambition was to sleep as much as possible, whether on or off watch.

"By jiminy, ol' Mugfoot sure had a excitin' time of it, all right," exclaimed Samuel Jones, for the thousandth time, addressing himself to Jimmy, who lay half dozing in his bunk—a narrow, crib-like affair, just above and a little to one side of the operating desk. "Here he tells how he got shipwrecked goin' from Bonga Tonga to Kinanakaluli, an' gets captured, along with eleven more of his gang, by enemy cannibals. The savages puts 'em all in a cave, 'an the chief scoffs one every week, until ol' Mugfoot was the only one left; an' the chief wouldn't eat him because he was too darn tough an' skinny. He was tryin' to fatten him up a little, when a trader comes along an' the skipper of the trader gets the chief to swap the scraggly ol' missionary fer three drinks of rum. I reckon the chief thought he was gettin' a lot the best of the bargain at that, but, anyway, that's how Mugfoot got saved from the ol' stew-pot. That sure must'a been a great life, eh Jimmie?"

Jimmie's only comment was a grunt, as he turned his face to the wall and tried to sleep.

"By jiminy, soon's I get a couple year's time in on this job, I'm goin' to strike the chief fer a big tramp steamer, an' go all over the world, 'an see some adventures like that myself, eh Jimmie?"

"Aw, fer th' love of Mike, lay off that adventure racket, will yuh!" grumbled Jimmie, growing peevish at being thus constrained from peaceful slumber. "You'd ought'a be thinkin' about gettin' married an' settlin' down."

Now this was an unfortunate remark, as Jimmie promptly discovered, for it brought upon him a long and brilliant lecture, in which the numberless advantages and incalculable value of travel was reviewed and enthusiastically dwelt upon, while matrimony and married life in general was scathingly disparaged and condemned to perdition.

"There's nothin' like travelin' an' adventure to learn a fellow somethin'," concluded Samuel Jones, earnestly, "'an travelin' an' marryin' don't mix. Course, I don't mind talkin' to the girls an' explainin' to 'em about the set, an' all that stuff, but you don't catch me fallin' in love with 'em—none of 'em! No darn woman's goin' to drag me up to a preacher like a fish on a hook 'an spoil my c'reer with matrimony—no sirree—!"

Just at this moment, the chief wireless operator's dissertation was interrupted by a distant silvery laugh, a sound of light footsteps tripping across the deck, and the appearance of a picture of feminine beauty in the doorway.

"O-o-o-o-h! This is the wireless, isn't it?" trilled the fair one, resting a daintily manicured hand upon the door. "Please, may I come in?"

"Yes, sure, come right in an' have a seat," exclaimed Samuel Jones, gallantly, arising and offering his chair to the charming visitor. Six months of wireless operating and explaining radio to lady passengers unnumbered had rather thoroughly broken Samuel Jones of his original countrified shyness.

With a sweet "Thank you," Evelyn Campbell stepped into the radio cabin and accepted the chief wireless operator's chair. As she did so, Samuel Jones could not help noticing that she was attractive—charmingly, seductively, irresistibly attractive. There had been many fair young visitors in the radio shack at different times, but the little beauty who now sat in the chief wireless operator's chair and smiled so alluringly at him, certainly outclassed anything yet. Samuel Jones was a trifle embarrassed.

"So this is a wireless, and you are a real wireless man, aren't you?" she bubbled with a glance of her glorious eyes that shot through Samuel Jones like a thousand arrows and made his heart palpitate strangely. "I'm just awfully interested in radio—please tell me about it, won't you?"

This was the chief wireless operator's cue; he promptly plunged into an explanation of wireless telegraphy that covered everything from motor-generator to buzzer-tester; appended with a history of the art, beginning with the discovery by Hertz of wiggly wave-motions, and winding up with the latest dope concerning a fellow who was dreaming about a queer thing that he called an audion.

"You must be just wonderful to know so much," rippled Evelyn Campbell, with another entrancing smile. "It must have taken you years and years to learn it all, didn't it, Mr. Jones?"

"Oh, I don't know; it only takes about four or five years, if a fellow's got any brains a'tall," answered Samuel Jones, modestly, as he put on the phones and proceeded to impress his fair visitor by throwing a lot of switches in and out, accompanied by a skillful twirling of miscellaneous knobs and dials on the antiquated tuner.

"Of course, the wireless game's gettin' a little harder all the time," he added, slamming up the plunger of the rickety underload-breaker and frowning thoughtfully at the storage-battery voltmeter; "they're gettin' a good many of them new quenched sets an' arc outfits out on the ships nowadays, an' a fellow's got to study a lot to keep up to date. But it don't take most operators more'n eight or nine years to learn to handle even them newest sets—"

The chief wireless operator paused as the "Wapama" slamming her bluff bows into the heavy seas running on the bar, began to roll and pitch, sickeningly.

"Oh, dear, I'm getting seasick," gasped Evelyn Campbell, rising. "I'd better go."

Expressing his sincere sympathy, Samuel Jones solicitously assisted the fair maiden to her stateroom.

Returning to the radio shack, the chief

wireless operator reseated himself, hung the phones over one ear, and took up the book of adventure. Locating the place where he had been interrupted, he began to read. He went scarcely a page, however, when he realized that the book had somehow become strangely stale and flat. Evelyn Campbell seemed to smile alluringly at him from between every line; his attention was distracted by unbidden thoughts of her shapely figure, her dainty hands, her seductively glorious eyes. With a sigh, Samuel Jones closed the book and shoved it back underneath the condenser rack. As he did so, he heard something that sounded suspiciously like a snicker. He glanced up sharply at Jimmie Morrow, who was still lying in his bunk, but the second operator apparently was dozing peacefully as usual.

Clamping down his phones, the chief wireless operator adjusted the carborundum detector and listened in. He heard the usual crash of traffic and he essayed to enter upon his favorite pastime: to take note of some particular signal and read it through all interference by sheer concentration—and failed. Wireless had become as stale and dead as the book of Bonga Tonga.

Samuel Jones had fallen. His fall had been sudden, headlong, and complete. He was subconsciously aware of the fact that he had fallen a victim to Cupid, but he firmly refused to admit any such thing—not even to himself.

The retarding wind that the "Wapama" met at the Golden Gate increased in strength and was attended by a choppy swell, in which the steam-schooner tossed and pitched wearily all through the night. Morning found her diving wildly into towering seas and barely holding her own with the gale.

The storm continued through the day. Evelyn Campbell was very seasick, and Samuel Jones worried a good deal about her. The chief wireless operator, recognizing his sympathetic anxiety for the fair traveler as something wholly unprecedented and altogether unbefitting one destined to a life of adventure on the high seas, strove with a vague uneasiness to stifle his thoughts by turning his attention to other things. But with poor success, however.

Toward nightfall the gale suddenly moderated somewhat. Samuel Jones happened around to Evelyn Campbell's stateroom, for the simple reason that he couldn't keep away; although he probably would have indignantly denied it, had anybody so insinuated. The charming passenger was not feeling much better, despite the abatement of the storm, but she did indicate a desire to get out on the upper deck and rest in a steamer-chair. Samuel Jones eagerly, yet rather diffidently, assisted her to a comfortable chair, which he placed behind a stack of life-rafts near the lee rail, where she would be sheltered from the wind. As he awkwardly proceeded to wrap her up in a warm deck blanket, to protect her from the chilly air, his hand touched hers once, and he experienced a wild, sharp thrill that left him quite confused afterward.

"It's awfully good of you to be so nice to me," said Evelyn Campbell, sweetly, when the chief wireless operator, having made her as snug and comfortable as he knew how, stood wavering, uncertain whether to go away or to hang around; "and, if you're not too busy, won't you stay and talk to me a little while, please?"

Samuel Jones was not too busy, and he stayed. Half an hour later, the "Wa-

pama" had occasion to alter her course a few points, bringing the heavy sea directly abeam. The result was immediately noticeable. As the old ship laid over on her very beam ends, from somewhere below there arose a terrific crashing, slam-banging of upsetting cans and buckets, followed by great streams of heartfelt profanity from the engine-room gang.

"Oh, oh," moaned the seasick beauty, as the vessel lunged, gaspingly and sickeningly. "If I had to endure such misery very long, I would jump right overboard."

"I'll go an' get you a glass of salt water an' a hunk'a stale bread," said Samuel Jones, anxiously arising at once. "That's good for seasick people."

He hastened down a companion-way to the galley, which was two decks below. As he filled a tumbler with water and stirred a little salt into it, the "Wapama" was unexpectedly caught up by a succession of unusually high and sharp-crested waves, in which she rolled more wildly than ever. Thinking to himself that this would make his fair protegee even sicker than she was, the chief wireless operator glanced out through a galley port-hole at the heaving waters, hardly visible in the increasing darkness; and, just as he looked, he saw something—a dark huddled object, a brief flash of white—fall by the open port and vanish noiselessly into the sea.

For a moment, Samuel Jones stood bewildered. Then his brain reacted to the testimony of his eyes with a terrifying recollection of Evelyn Campbell's threat to end her seasickness—to commit suicide. What he had seen had fallen from directly above—from the very place on the upper deck where he had left Evelyn in her steamer-chair. His imagination swiftly reconstructed what he had seen falling—the little dark figure, the flash of white petticoats! And, as this awful conviction laid hold of Samuel Jones with an icy grip, with it there came like a crash of lightning the burning realization that he loved Evelyn Campbell—that he loved her deeply, intensely, mightily. It was a crystallization of feeling under stress of catastrophe, and in its dazzling revelation Samuel Jones was electrified to action. Throwing aside the tumbler of water, he sprang up the companion-way to the poop deck.

"She's overboard!" he shouted to the officer on the bridge. "She's overboard! Stop the ship! Quick! Stop her! Stop her!" His breaking voice rose in wild anguish above the thumping of the engines and the churning of the propeller.

Almost instantly, the engine-telegraph clanged sharply; with a squeal and a jerk the throbbing pistons came to a sudden stop. People seemed to spring from nowhere from out the darkness; anxious questions were hurled back and forth; up on the pilot house the ship's searchlight sputtered into action. Coming out of his cabin, the captain of the "Wapama" saw the crowd gathered on the poop and he hastened aft. Incoherently, Samuel Jones began to tell of what he had seen go by the galley port-hole. Before he could finish, a loud guffaw broke in on his stumbling words. It was a rude, coarse laugh, altogether out of keeping with the tense and dramatic situation. Everybody turned. Under a deck light stood a brawny wiper, clad in greasy overalls. In his hands was a big chunk of waste, with which he was wiping lubricating oil from his face and forearms.

"Shure, an I knows what yiz saen, fur

I wuz here an' haaved it ouver mesilf!" he asserted, in his strong brogue. "Didn' yiz hear th' ile cans upsittin' whin th' ould gurrl took that beam-inder a bit ago? I jist clained up the worst av th' dirty mess an' brung up th' swabbins. 'Twas a sack av greasy rags yiz saen chicked ouver th' side, an' naught ilse, begorra!"

Somehow, Samuel Jones managed to escape from the crowd. Going up the second companion-way to the upper deck, he went behind the stack of life-rafts to the place where he had left Evelyn Campbell. He found her just as he had left her, snuggled warmly in the blanket he had put around her. She was fast asleep.

Of course, Samuel Jones suffered a severe reprimand from the captain, and all the ship made him a victim of merciless jibes. He bore it all, however, without flinching. He didn't really care. The incident, absurd as it was, had brought him conscious realization that he was deeply enamored of Evelyn Campbell; thereafter nothing else mattered. From that time on to the end of the voyage he hovered over his fair lady with a tender solicitude that seemed blissful and sublime to him; although it was ludicrously funny to everybody else. He attended to her every trifling wish that it was in his power to gratify, he stole fruits and delicacies from the ship's ice-box for her, he bribed indifferent stewards to prepare appetizing broths and tempting salads—and the stewards saw to it that his bribes were substantial.

As he had no time to sleep, he stood his watches in a comatose condition, in which he dreamed of matrimonial blisses and pictured himself living in a second Paradise with his Eve. In his waking moments, he thumbed a home-builder's catalogue that he had unearthed somewhere; or pondered on the rather knotty problem how he was going to feed his fair lady all the bacon and beefsteak she wanted; how he was going to furnish her with expensive silk stockings and, er—other needful things; and how, at the same time, he was going to pay instalments on a four or five thousand dollar bungalow for her to dwell in—all on his salary of thirty-seven dollars and fifty cents a month. (Remember, dear reader, this was not 1921.) Although it hardly seemed workable in figures, Samuel Jones knew that, according to the service regulations of the wireless company, he soon would be entitled to an increase in salary of two dollars and fifty cents a month; which would help some, anyway.

The heavy weather stayed on all through the trip and Evelyn Campbell (purposely perhaps) remained more or less seasick. Samuel Jones was at her side as much of the time as possible, stoically indifferent to the open ridicule of the ship's company and the caustic comments of the captain.

The fourth night out, the much-delayed "Wapama" rounded Point Arguello and entered the smooth water of the Santa Barbara Channel. Evelyn Campbell became well immediately. In the morning, when the little steamer made fast at the San Pedro wharf, the fair beauty was almost the first one down the gangway.

Samuel Jones was half way through the laborious process of changing into his "shore clothes," when he chanced to look out through his cabin window and saw her going. Frantically, he hunted

(Continued on page 264)

~ ~ RADIO DEVELOPMENT ~ ~

THE NEW MAGNAVOX

A LONG with the increased popularity of the small radiophone set has come an increased demand for some sort of device which would eliminate the customary headphones and enable the received voice or music to be heard by many people at the same time. Many devices of this sort have been available, but have not been any too satisfactory because the volume of sound which could be given off was limited by the construction of the receiver used. Of what use is great amplification if the receiver or loud speaker will give forth volume up to a certain point, and then no matter how much the input is increased no louder signals be heard?

The electromagnetic type of receiver has that disadvantage—its final output of sound is limited by very definite mechanical and electrical proportions. If the input is large the diaphragm is pulled down so far that it hits the pole pieces, if the diaphragm is placed far enough away from the pole pieces, so that it cannot hit them, then the action of the magnetic flux is so reduced that very weak action takes place. Again in the electromagnetic receiver the input is used in making greater or less the magnetic flux and acts only indirectly, in that way, on the diaphragm.

A type of receiver, electro DYNAMIC in design has been invented, for some time and shows quite different characteristics in its action on signals. The commercial form of this receiver is known as the Magnavox Radio Telemegafone and is very interesting in its design and operation.

The electrodynamic receiver is essentially built along the lines of a motor, except that the armature does not rotate but merely imparts its motion to a diaphragm directly. The armature is a small coil of fine wire inserted directly in a very strong magnetic field, being perfectly free to move up and down with nothing to hinder except for the elastic limit of the diaphragm. There is not the slightest action on the diaphragm except when a pulsating current is passing through the little coil, no magnetic pull, and the diaphragm is made of a non-magnetic substance. When a pulsating current is passed through the little coil, it tends to jump in or out of the magnetic field according to the direction of the current in the little coil.

Of course, then there are no limits to the volume of sound to be produced except for the input and the capacity of the little coil. If the coil be made of such wire that it cannot burn out, the diaphragm can be broken or shattered by the power developed. In practice this never happens for very few amplifiers can deliver enough modulated current to cause such an accident.

The volume of sound emitted is DIRECTLY proportional to the amount of input. Thus when the telemegafone is attached to a power amplifier, a volume of sound is produced from the ordinary human voice, using a hand transmitter, such as has been heard under the most favorable conditions for several miles overland and from over six thousand feet from an aeroplane flying overhead.

This type of apparatus is necessarily much more expensive to construct than the ordinary telephone receiver, but of course will give far greater volume of

sound than it could be possible for any other type of receiver to emit.

It has one great field in the radio game—that of being used in a radio station with a one-or two-or more stage



Photograph courtesy of The Magnavox Company.

amplifier to broadcast the received signals throughout the room or building in which the radio station is erected. It really puts the radiophone on a par with the wire phone in that it allows signals to come in with such volume that a practical calling system may be installed and a continuous watch with head receivers made unnecessary.

The New RADIO MAGNAVOX recently announced by the Magnavox

A NEW GENERATOR FOR PLATE CURRENT SUPPLY

Before purchasing your radio telephone the source of high voltage D. C. should be decided upon. In isolated districts, where the burning out of rectifier tubes, used with C. W. power transformers, would be of major consideration, the use of reliable Motor-Generator outfits is to be recommended, even though the first cost is slightly higher.

The type of Motor-Generator shown, was designed for radio work, and is furnished as standard equipment by one of the most prominent makers of Radiophones. The small and medium sizes have ball-bearings and single, direct coupled shafts, assuring maximum efficiency. They are of mod-

erate weight, rugged construction and built of best material. Motors are, 110 V, S. P. 60 Cycle, A. C. Wattages, 50-1000, and Voltages, 350, 500 and 1000.

Company of Oakland, California, is of especial interest to radio enthusiasts because of the fact that its price is such that it can now be used by a great many stations which otherwise could not be the possessors of such an instrument. The internal constants and constructional details are somewhat different from its bigger brother the Radio Telemegafone, and yet the emitted volume with a given input remains the same. The only difference which could be noticed is a small change in field current, the new instrument taking a very little more in the field than the other types. The new instrument is made under the same patents as the radio telemegafone.

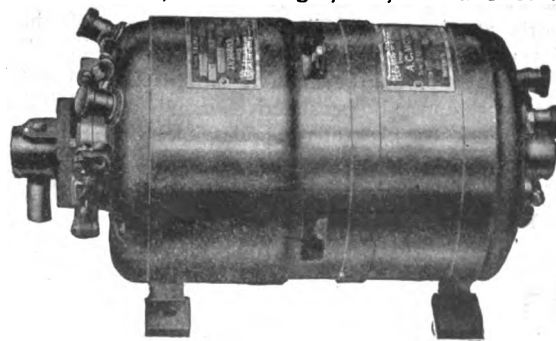
Good signals will be had when the field is excited by dry cells delivering from 2 to 4 volts, although maximum results will be obtained with 6 volts. This is the voltage at which saturation takes place.

MOORHEAD REPRESENTS DE FOREST CO. IN WEST

It was announced yesterday that the De Forest Telephone and Telegraph Company of New York has contracted with the Moorhead Laboratories, as its Western representative, the contract entailing the taking over by the Moorhead Laboratories of the business of Lee De Forest, Inc., San Francisco, manufacturers of radio telephone apparatus.—S. F. "Examiner."

NEW MANUFACTURER OF RADIO APPARATUS

MR. H. Malarin, formerly Radio Inspector for the Radio Corporation of America in San Francisco, has joined Mr. E. L. McDonald in his manufacturing enterprise. The newly formed Company has placed several unique pieces of radio apparatus on the market. A cage-wound filament rheostat, variable bridging condenser and a filament protective device for vacuum tubes are the first instruments manufactured by the new concern. Mr. McDonald is well-known in the local radio fraternity, being formerly connected with the Navy Radio Service at the Union Iron Works.



(Photograph courtesy of the Somerville Radio Lab.)

6EA IS HEARD IN NEW JERSEY, 6ZR IN PENNSYLVANIA TWO NEW RECORDS FOR PACIFIC COAST AMATEURS

ANOTHER long distant amateur record has been made. Station 6EA in Los Angeles, California, has been heard by Mr. H. D. Selvage, (2KF), Irvington, N. J. The following letters will prove to our readers that the signals were received:

Irvington, N. J.,
January 17, 1921.

Pacific Radio News,
50 Main Street,
San Francisco, Cal.
Dear Sirs:

By the time you receive this letter I suppose you have heard the glad tidings re: the remarkable feat of long distance reception. On the morning of January 4th, 2:55 a. m. E.S.T. I heard 6EA calling 6GF and 6GO so I wrote to him (Mr. Seefred) for a verification of same and he co-operates my long distance feat by telling me that the time, calls called, and wave-length compare exactly in every respect. You can get in touch with Mr. Seefred and judge for yourself the remarkable feat which has been accomplished.

On the above mentioned date I also heard 6GO and wrote to him and he verifies my statement in regard to letters called, wave-length in meters and time.

Should you want to publish letters in "Pacific Radio News" at some future date please advise me. I have the letters here in my file.

Yours truly,
H. D. SELVAGE,
45 Durand Place,
Irvington, N. J.

2KF

Berringer Heard by 8FQ

—
Only one step of
amplification used
—

6ZR, formerly 6BJ, of Burlingame, Cal., was heard by Mr. F. Baumgarten, 8FQ, in Pittsburgh, Pa., January 16, at 3 a. m.

6XW's phone set at the Presidio was heard 750 miles at sea.

—
The call letters of Mr. Berringer's station have been changed to 6ZR and a special license has been granted him by the Department of Commerce. The transmitting wave-length is 350 meters.

343 So. Fremont Ave.,
Los Angeles, Calif.
January 23, 1921.

Editor: "Pacific Radio News",
50 Main St., San Francisco, Cal.

Dear Sir:

I am in receipt of a letter from an East Coast amateur stating he had heard my station 6EA. A copy of the letter is as follows:

Irvington, N. J., January 4, 1921.
Mr. H. C. Seefred,
Los Angeles, Cal.

Dear Sir:

I am writing to you this day to see if I can attain a verification of extreme long distance on 200 meters, this morning at 2:55 Eastern Standard Time. I am quite positive I heard you calling 6GF or 6GO and 6AK. Almost every night I hear 1st, 2nd, 3rd, 4th, 5th, 8th and nines. I am using a detector and 3-stages of amplification. Please answer by return mail.

(Signed) Yours truly,
H. D. Selvage,
45 Durand Place,
Irvington, N. J.

2KF

This letter was verified by my log book. I also told him to send the good news to "PRN" and "QST".

The power input of my transmitter now is 7.65 watts as tested by a standard watt-meter used daily by the Southern California Edison Company. The radiation is 4¼ amps. as tested by a Westinghouse thermocoupled meter.

Very truly yours,
Radio 6EA
H. C. Seefred.

RADIO CLUB NEWS

SAN FRANCISCO RADIO CLUB TO HOLD "STAG PARTY"

ON Thursday evening, February 17, the San Francisco Radio Club will hold the first of a series of quarterly socials. Entertainment, refreshments, music and lectures will be the important parts of the program. An open invitation to attend is extended to all radio men in and around San Francisco.

New practice tables are in the course of construction and competitive tests will be held monthly. Sergeants Lufkin and Tavers, the "Radio Telephone Entertainers" from the Presidio, delivered an interesting address on radio telephone work at the usual Thursday meeting, February 10th.

The membership campaign is still in progress and all prospective members are urged to file their application for admission at the earliest date.

RADIO CONVENTION PHOTO- GRAPHS

HAVE you received your photograph of the Convention? If you have paid for same and have not received it to date, please send your name and address to the Secretary of the San Fran-

cisco Radio Club and steps will be taken to have the photograph forwarded to you.

BAY COUNTIES CLUB TO PUBLISH PAPER

"BCRC" is the title of an eight-page publication that will be issued monthly by the Bay Counties Radio Club. Copies will be mailed to members without cost. Club news, current topics, discussions and other matter of interest to the amateur will go far towards making the paper one of much interest.

Mr. H. Rathbun, Chief Radio Engineer of the Colin B. Kennedy Company of San Francisco, spoke on the betterment of receiving sets at the meeting of the club held on February 4th.

ON Wednesday evening, January 19, 1921, a special meeting of the University High School Radio Club was called at the home of the president, Russell E. Calhoun, 2436 Dwight Way, Berkeley, Cal. The feature of the meeting was a speech by radiophone given by Sergeant Tavers, 6XW, of the Signal Corps Radio School at the Presidio, San Francisco.

The subject of the speech was the construction and operation of a radiophone outfit. The speech was received with one audiotron, and with the aid of a loud speaking horn could be heard at a distance of from 50 to 60 feet from the instruments. The voice was very clear and could be heard above all ordinary conversation.

Other numbers on the program of the meeting were a talk by Justin Toles, 6CF, on his humorous experiences in radio before the war, and also a demonstration of the Tesla coil.

The University High School Radio Club was formed about six months ago at the University High School, Oakland. The officers of the club are: President, Russell Calhoun, 6FZ; secretary, Horace R. Greer, 6TI; radio engineer and chief operator, Charles Wilson, 6LE; honorary treasurer, D. McCay (faculty).

All future proceedings of the club will be made known through these columns.

Don't throw your copy away when you finish reading it. Show it to your radio friend and ask him to subscribe.

THE SECOND ATTEMPT TO REACH HAWAII

IN the February issue of "Pacific Radio News" we informed our readers of the second Hawaiian transmitting contest and asked for four additional participants, as four had previously expressed their desire to enter. In response to this request we received a mass of telegrams, radiograms, letters by special delivery mail and telephone requests to enter various stations on the Pacific Coast. Mr. Mulrony requested that no more than four stations be entered for each of the two nights of the test, and for this reason it was necessary for us to select the four best stations. The following were selected for the night of February 5th: 6ZE, 6ZR, 6EA and 6ZK. For the night of February 6th the following were selected: 7DA, 7BJ, 6PQ and 6JI. These stations were selected by a committee of four well known local radio men. The location of the stations in some cases was given particular stress, as it was our desire to "shoot" from all four corners.

We desire to congratulate the contestants on the skillful manner in which the test was conducted, and we again have to advise you that the test was not a success. Here is what Mr. T. Hall of Honolulu says in a wire received just as we go to press:

"Signals not readable Q. R. N. Most foul." Signed Hall.

This message leads us to believe that signals were heard on the short waves, but were not readable on account of the heavy static. We will await word from Mr. Mulrony and several Honolulu amateurs who were listening-in on the particular nights and publish further information in our next issue.

In the meantime we are arranging for an "elimination contest" with a vessel at sea. The purpose of the new contest is to give every Pacific Coast amateur a chance to be heard. Stations will send each night for a period of seven nights and the operators on several merchant ships will listen-in for you. Amateur signals were heard 300 miles east of Honolulu by the S. S. "Hollywood." 7YS was reported heard QSA.

Send us your applications for the new contest and look for full details in the April number of "Pacific Radio News."

RADIO TELEPHONE SHOP HOLDS PRIZE CONTEST

THE first of a series of prize contests ever held by a Pacific Coast radio manufacturer is now in progress. A radio telephone has been installed in the Radio Telephone Shop of San Francisco. It is in operation every Tuesday and Friday evening at 8 p. m. The wavelength used is exactly 220 meters. The call is 6UV. Prizes will be awarded to those hearing the telephone at the greatest distance from San Francisco. C. W. telegraph signals will also be transmitted and prizes awarded to those hearing it at the greatest distance. News items transmitted by voice and C. W. will be the procedure. The conditions of the contest will be announced by radio several minutes before the contest is made effective.

SIXTH DISTRICT AMATEUR STATIONS—Continued.

6AJA	C. Simpkins	Napa, Cal.
6AJB	J. Kaufman	803 West Oak St. Stockton, Cal.
6AJC	D. L. Hersch	1031 S. Manhattan Place Los Angeles
6AJD	L. Hewitt	135 West Willow St. Stockton, Cal.
6AJE	C. D. Elfving	3344 McHenry Ave. Modesto, Cal.
6AJF	F. C. Jones	1822 Hearst Ave. Berkeley, Cal.
6AJG	J. H. Doig	2133 Columbia St. San Diego, Cal.
6AJH	L. Picker	San Ysidro, Cal.
6AJI	W. Terrberry	676 Apgar St. Oakland, Cal.
6AJJ	H. C. MacQuarrie	1115 Taylor St. San Francisco.
6AJK	H. C. Crabtree	660 West Hadley St. Whittier, Cal.
6AJL	G. Bergstrom	616 Twentieth St. Ogden, Utah.
6AJM	F. L. Mason	540 Johnson St. Healdsburg, Cal.
6AJN	D. O'Brien	643 Porier St. Oakland, Cal.
6AJO	C. B. Schuler	604 Third St. San Diego, Cal.
6AJP	L. Wolfson and W. Burgess	Maricopa, Cal.
6AJQ	H. Schulz	1477 Benton St. San Jose, Cal.
6AJR	R. L. Roy	941 Court St. Reno, Nev.
6AJS	E. Josselyn	620 Golden Gate Ave. San Francisco
6AJT	Humbolt County High School	Winnemucca, Nev.
6AJU	O. Buckman	Farmington, Cal.
6AJV	R. M. Bottoms	1146 P St. Fresno, Cal.
6AJW	W. Bolberg	541 Yosemite St. Manteca, Cal.
6AJX	A. Andreason	Richfield, Utah.
6AJY	H. C. Lovell	10 Mosswood Road Berkeley, Cal.
6AJZ	F. J. Saunders	2515 LeConte Ave. Berkeley, Cal.
6AKA	G. S. Kimball	1041 East Seventeenth St. National City, Cal.
6AKB	R. D. McCurdy	142 Pine Ave. Los Angeles, Cal.
6AKC	J. W. Morton, Jr.	1515 Clayton St. San Francisco
6AKD	G. E. Hulstead	1566 Tenth St. San Diego, Cal.
6AKE	K. W. Nicholson	P. O. Box 156 Woodlake, Cal.
6AKF	R. M. Bollinger	Cardiff-by-the-Sea, Cal.
6AKG	W. Barnes	408 Nutmeg St. San Diego, Cal.
6AKH	C. Maass	520 Twenty-first Ave. San Francisco, Cal.
6AKI	V. C. Hammond	440 Patchett St. Napa, Cal.
6AKJ	P. H. Goodwin	Oildale, Cal.
6AKK	J. C. Arbuckle	343 Tenth St. San Diego, Cal.
6AKL	R. L. Rogers	4102 Campus Ave. San Diego, Cal.
6AKM	E. L. Pickett	6057 Meridian St. San Diego, Cal.
6AKO	A. B. Barnes	1203 Twenty-fifth St. San Diego, Cal.

PACIFIC COAST ADVISORY COUNCIL TO MEET AUGUST 15

THE first quarterly meeting of the Pacific Coast Advisory Council will be held in San Francisco on Tuesday, March 15th, at 7 p. m., in the Palace Hotel.

A banquet of radio men will make the opening of the first assemblage of the recently formed Council. Major J. F. Dillon is Chairman of the Council and with the assistance of five of our most prominent Western radio men it is believed that many startling decisions will be made. Radio Clubs on the Pacific Coast are asked to send arbitrary or other matter for discussion to the Chairman of the Council at the first opportunity.

Wavelength regulations for CW and radio telephone equipments will be discussed and steps will be taken to permit of the use of longer wavelengths for the undamped systems as used by amateurs.

Radio Clubs in the vicinity of San Francisco are invited to send delegates to the first meeting of the Council. The San Francisco Radio Club, Inc., is assisting Major Dillon in his work and full information may be had by writing to the Secretary.

As many radio men as possible are asked to attend the banquet. The charge will not be prohibitive and a rip-roaring time will be had by all. Accommodations for out-of-town guests will be made by the local radio club. It will be necessary to have the arrival data in the hands of the club at least ten days before the affair takes place.

All matter to be arbitrated must be submitted in writing in order that a full account of the proceedings may be kept on file.

The formation of the "Council of Six" has been highly lauded by officials of the many radio companies in San Francisco.

CALLS HEARD BY WESTERN AMATEURS

CALLS HEARD AT STATION 6AHQ MONETA, CAL.

6AH, 6AK, 6AN, 6AS, 6BJ, 6BQ, 6CP, 6DF, 6CU, 6EA, 6EB, (6EF), (6EK), (6EN), (6ER), 6EV, 6FL, 6GA, 6GH, (6HY), 6IF, (6IL), 6JD, (6KA), (6KZ), 6KC, 6KP, 6KY, 6ML, 6MN, 6MZ, 6MJ, (6NY), 6JI, 6OC, 6OD, 6PC, 6PD, 6OR, 6BQ, 6WU, 6CU, 6ZA, 6ZN, (6TL), 6BN, 6IG, 6GA, 6AAB, (6ABP) 6ADS, 6ADU, (6ADX), 6AEF, 6AEM, 6AFN, 6AFW, 6AGP, 6AHU, 5ZA, 7IN.
Stations hearing 6AHQ please QSL.

CALLS HEARD BR 6EA (Additional)

Heard: 6ACD, 6AFN, 6AFU, 6AFY, 6AS, 6BB, 6CI, 6FH, 6GY, 6I-CW, 6JQ, 6PO, 6TH, 6ZO, 7LN, and 9LR.

Worked: 6AEA, 6BQ, 6DK, 6FI, 6GF, 6GK, 6NH, 6NO, 6OW, 6TC, 6ZR, 7ZR, 7YA, 7ZJ and "FD."

During January station 6EA was reported heard by 2KF (Irvington, New Jersey); 5XA (Auburn, Alabama); 5AL (Greenville, Texas); 9DU (Independence,

Missouri); 9IF (Giltner, Nebraska), and 9LR (Anthony, Kansas).

CALLS HEARD AT 6MX (San Francisco)

6CQ, 6DP, 6EJ, 6EN, 6ER, 6FH, 6GI, 6IY, 6JD, 6OH, 6SK, 6TC, 6TU, 6ABP, 6ACW, 6AIL, 7AD, 7GQ, 7KK, 7ZI, and 7YA.

The call letters of 6MX were incorrectly listed as 6XM in our last issue.

CALLS HEARD AT 6AH (Oakland, Cal.)

(5ZA), (6AAK), (6ABP), 6ACR, 6AFY, (6AGF), (6AFN), (6BQ), (6CV), 6DI, (6DP), (6FS), 6FH, (6GF), (6GI), 6HY, 6HX, (6HH), 6IF, (6IG), 6II, 6IL, (6IC), (6IU), (6JI), (6JT), 6KQ, 6KM, 6MZ, (6MN), (6NY), (6OH), 6PJ, 6PM, 6PQ, (6PR), 6QM, 6QR, (6SK), 6WM, 6WN, 6WR, (6ZA), 6ZH, 6ZM, 6XZ, (7AD), (7BP), (7CC), (7ZJ), (7DA), (7GQ), 7HN, (7M), (7JW), (7KK), (7ZI), 7ZB, 7ZA, 7NE, (7YA), 7YS, and 9YW readable six feet from the phones on January 19 at 11 p. m., Pacific Time, wave-length 375 meters. He is located in Rapid City, South Dakota.

CALLS HEARD AT 6AIF (Bakersfield, Cal.)

5XD, 5ZA, 5ZJ, 6ACD, 6ADA, 6ADX, 6AE, 6AFN, 6AGF, 6AIO, 6BAA, 6BAB, 6BAC, 6BJ, 6BQ, 6CZ, 6EB, (6EJ), 6EN, 6ER, 6FI, 6FN, 6GQ, 6IR, 6JD, 6JR, 6KM, 6KP, 6OH, 6PR, 6SK, 6UO, 6ZA, 6ZE, 6ZK, 6ZM, 6ZN, (7GQ), 7IN, 7YA, 7YG, 7ZH.

6BAA, 6BAB and 6BAC are stations operated by the Southern California Edison Co. Mr. Winsor, 6AIF, spent his furlough at his home in Bakersfield during the latter part of January and is now working the U. S. Naval Radio Station at Honolulu, T. H.

HEARD AT 6JJ, FRESNO, CAL.

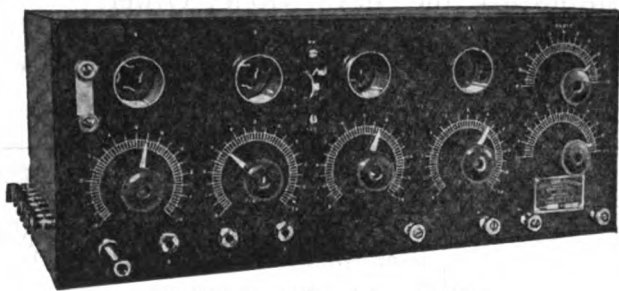
5ZA, 5ZZ, 6AH, 6AJ, 6AK, 6AN, 6AAB, 6AAK, 6AAT, 6AAW, 6ABP, 6ADE, 6ACA, 6ACD, 6AIL, 6ADU, 6ADX, 6AFU, 6AFY, 6AGF, 6BJ, 6BQ, 6CO, 6CV, 6DI, 6DP, 6DY, 6EC, 6EL, 6EN, (Spk) 6EN, (CW) 6EJ, 6EX, 6EB, 6FI, 6FT, 6FX, 6GE, 6GF, 6GI, 6GR, 6HY, 6IC, 6IG, 6IL, 6IR, 6IU, 6IX, (CW) 6IE, 6IN., 6IT, 6KA, 6KF, 6KI, 6KQ, 6KS, 6KZ, 6NE, 6NY, 6OC, 6OH, 6OL, 6OT, 6PC, 6PE, 6PL, 6PO, 6PR, 6OM, 6SK, 6TC, 6TL, 6TY, 6UM, 6VS, 6WR, 6XX, 6XZ, 6ZA, 6ZB, 6ZH, 6ZK, 6ZM, 7AD, 7BH, 7BP, 7BO, 7BR, 7BV, 7CC, 7DA, 7FD, 7GQ, 7GY, 7IM, 7IU, 7KK, 7YA, 7YS, 7ZH, 7ZI, and 7ZJ.

6JJ would be pleased to have any stations hearing him to QSL.

PS.—At about ten P. M. on the 11th of November, while experimenting with a counterpoise ground, Radio Shop regenerative set, and Acme units consisting of a detector and two-step amplifier. 6JD, 6ER and ex 6JM were heard 140 feet from the phones in the open air. I was using one Baldwin phone in a phonograph horn and the other was laying on the table. 6EA, 6EB, 6FE, and 6BQ were loud enough to copy about 60 feet, also in the open air.

SPECIAL FEATURES IN APRIL ISSUE: Aerial Mail Arc Stations; Another fiction story by Mr. Mathison; The Jeencke Arc, and others. Don't Miss it!

Do You Like Pigs?



Z-Nith Amplifon Type AGN-3

No? Well then you probably don't like the pig-like squeal of the ordinary three-step amplifier.

Our Amplifon Type AGN-3 detector and three-step amplifier absolutely *does not squeal*, but it sure makes signals roar in.

The ideal audion control cabinet for use with a Regenerative Receiver, because of plate battery controls found on *no other* control panel.

Used by 9ZN throughout the record-breaking "Transcons," linking the Atlantic and Pacific.

Our new Bulletin F-21, out March 1st, tells all about it, as well as the new Z-Nith Multiceiver and many other new products. If your name is not on our mailing list write us.

The Chicago Radio Laboratory

Offices: 1316 Carmen Ave. Testing Station: 9ZN, 5525 Sheridan Road
CHICAGO, ILL.

RADIO CLUB DIRECTORY

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts. San Francisco, Calif. Meetings every Thursday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

HEARD AT 6CU

Los Angeles, Cal., Oct., Nov., Dec., 1920

5ZA, 6AAJ, 6AAK, 6AAT, 6AAW, 6ABJ, 6AE, 6AFU, 6AFY, 6AGF, 6AH, 6AJ, 6AK, 6AN, 6AT, 6BJ, 6BN, 6BP, 6BQ, 6CN, 6CO, 6CP, 6CV, 6CW, 6DH, 6DK, 6DP, 6EJ, 6EX, 6FE, 6FI, 6FS, 6GE, 6GF, 6GO, 6GR, 6IB, 6IC, 6IG, 6II, 6IY-CW, 6JI, 6JN, 6JR, 6KM, 6MZ, 6NE, 6NO, 6NX, 6OH, 6OT, 6PJ, 6PR, 6QN, 6QR, 6QY, 6RE, 6XX, 6XZ, 6ZA, 6ZB, 6ZE, 6ZH, 6ZK, 7BP, 7BQ, 7CC, 7DA, 7GY, 7YA.

The greatest distance heard is in black face type.

CALLS HEARD AT 6CH

5ZA, 6AK, 6AAT, 6ACA, 6BQ, 6CV, 6DK, 6DP, 6EB, 6ER, 6EN, 6EJ, 6FH, 6GO, 6HY, 6IC, 6IF, 6JD, 6JM, 6JI, 6KP, 6KI, 6LY, 6OL, 6OP, 6OH, 6QR, 6SK, 6TS, 6XZ, 6ZN, 6ZA, 6BY, 7BQ, 7BP, 7BK, 7BR, 7BC, 7CC, 7CV, 7CP, 7CD, 7CW, 7DA, 7DE, 7DI, 7ED, 7GO, 7IV, 7IN, 7RK, 7ZJ, 7ZI, 9WU, 9EE, 9UV, 9LR.

(New address of 6CH is H. C. Brown, 1737 Union Street, San Francisco. Anybody hearing 6CH kindly drop card. All communications answered. Working hours 11 p. m. to 2:30 a. m. every night.) Gee, what a night-hawk.—Ed.

HEARD AT 6OC BETWEEN

DECEMBER 7th-FEBRUARY 7th

5ZA, (6AS), (6AK), 6AY, (6CV), (6DP), 6DH, 6DK, (6EA), (6EB), (6EJ), 6EK, (6EN), 6ER, (6FH), (6FS), 6GF, 6GI, (6GM), 6GP, 6GR, 6HH, (6IC), 6IF, 6II, 6IL, 6IU, (6ID), 6JI, 6JJ, (6KA), 6KM, (6KP), 6MH, 6MN, (6OH), 6PE, 6PQ, 6QR, 6RE, (6SK), 6TL, 6XZ, 6ZA, 6ZH, 6ZO, (6ZN), (6AAK), 6ABM, (6AFN), 6AFU, 6AGF, 6AIO, 7BJ, (7BP), 7BR, 7CC, 7CW, (7DA), 7DS, 7ED, (7GQ), 7HN, (7IN), 7YA, 7ZB, (7ZJ), 9ET, 9WU.

The EDITOR'S MAIL BAG

Our Readers Are Invited to Send Contributions for Publication in this Department.

San Francisco, Jan. 29, 1921.

Editor, Pacific Radio News,

50 Main Street,

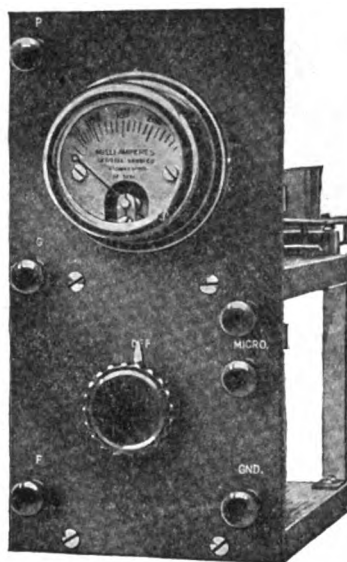
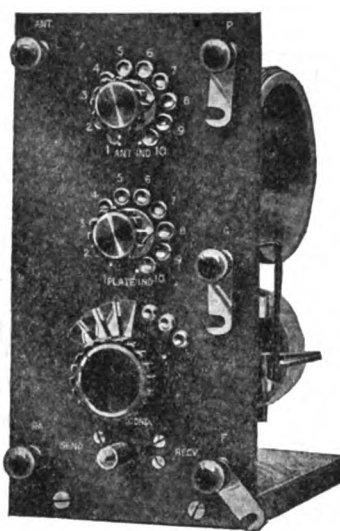
San Francisco, Cal.

Dear Sir:

I would like to call your attention to the account published in the San Francisco Bulletin of January 21, 1921, which is but one of several mythical long distance radio telephone records reported during the past few weeks by Pacific Coast amateurs and printed in the newspapers. The article about the Avalon radio telephone has absolutely no foundation and is a product of the vivid imagination of either the newspaper reporter or the amateur mentioned in the article. I would regret to cast any reflections on the latter, but the Avalon and Long Beach stations of the telephone company are equipped with specially designed receivers for only one wave length, and the operators are forbidden to change the adjustments. Hence the idea of talking to Annapolis (Continued on page 267)



ANY AMATEUR CAN TALK 30 Miles by Wireless Telephone WITH THIS NEW MIDGET "RADIOPHONE" * Transmitter

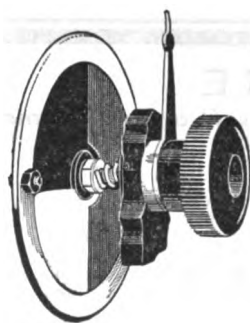
Aerial Oscillating
Circuit Panel(Type
OT-3)Power Tube Panel.
(Note clamps for fastening panels
together into simple unit).

* "Radiophone"—name copyrighted.

HERE is the most remarkable radio telephone for its size ever made. Complete in every detail. Works on any source of direct or alternating current, supplying up to 500 volts. Tuning done by tapped switches. Only one 6-volt storage battery required; for filament, microphone and "B" battery. Rectifier or Motor Generator supply may be used. Tests show a 30-mile telephone range, and greater range is possible. Set mounted on two Bakelite panels, each 4½x9 inches. Aerial Oscillating Circuit Panel, with all necessary controls and transfer key switch. Price—\$55.00 (without microphone). Power Tube Panel contains tubes, ammeter and filament rheostat. Price—\$45.00 (without tubes or power supply). Entire set well made and nicely finished. Get full details at once. Order early to assure prompt delivery, either through your regular dealer or direct from us.

DeForest Radio Telephone & Telegraph Co.

Inventors and Manufacturers of High Grade Radio Apparatus
1425 SEDGWICK AVENUE NEW YORK, N. Y.



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft...\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16

PARKIN MFG. CO.,

Dealers: Write for discounts

San Rafael, Calif.

A VACUUM TUBE UNIT

Will greatly increase the receiving range of your station. The combination shown opposite consists of the "A-M" Detector Unit and the Radiotron U. V. 200 tube. This makes a complete V T Detector outfit—well within the reach of every amateur.

Price, complete, \$11.00

*The greatest value ever offered!
Send in your order today*

The "A-M" Vacuum Tube Unit

Incorporates in a single unit, a VT socket, filament rheostat, grid condenser, grid leak, and binding posts. Mounted composition base.

*Get one at once,
and mount your own VT. Price \$6*



Order your NEW Radiotron Tubes from Us

Radiotron U. V. 200

THIS NEW detector and amplifier is the latest product of the research laboratories of the General Electric Company. It has been specially designed to meet the requirements of the amateur and experimental field, viz: the production of a tube which would prove a sensitive detector and a superior amplifier, and which could be operated off a single standard 22½ volt plate battery.

Radiotron U. V. 200 is the best radio detector and audio frequency amplifier yet produced. It is particularly adapted to standard regenerative circuits, in which it functions with greater sensitivity and stability than any other tube.

Best detector action is provided by a grid condenser of 0.00025 MFD capacity and the Radio Corporation's standard grid leak of ¼ MEGOHM resistance. The plate voltage must be closely adjustable from 18 to 22½ volts. The requisite variation of the plate voltage must be obtained in three ways: (1) By a standard "B" battery potentiometer; (2) by a "B" battery with taps to each cell; (3) by a special "A" or filament battery

potentiometer of 200 ohms which will be manufactured by the Radio Corporation. In the case of the last-mentioned method the negative terminal of the "B" battery (which is tapped from the 12th cell) connects to the variable contact on the "A" battery potentiometer.

Radiotron U. V. 201

THE TUBE is also a newly designed detector and amplifier of the piliotron type, which was developed in the General Electric Company's research laboratory. Experts who have tested this tube pronounce it to be the most efficient and stable amplifier available to date. The normal plate voltage is 40 (2 standard "B" batteries), but plate E. M. F.'s up to 100 volts may be used with increasing amplification. Price \$6.50.

All Radiotrons are manufactured in accordance with rigid specifications, assuring a uniform product.

They are made to fit standard four-prong sockets. Watch future announcements for data concerning the other types of tubes and devices which will be soon placed on the market.

The NEW Radisco Better "B" Batteries
(Tapped), 22½ volt, 15 cell, with variable voltage feature. \$2.65

ATLANTIC RADIO CO., Inc.

88 Broad St.
Boston, 9, Mass.

Branch, 15 Temple St.
Portland, Maine.
Request Bulletin 14

MAGNET WIRE

We have on hand the following sizes of pure, soft-drawn enameled magnet wire:

Size B. S.	Ft. per lb.	¼ lb.	½ lb.	1 lb.	1½ lbs.	2 lbs.
16		35c.	55c.	\$1.00	\$1.50	\$1.95
22	500	40c.	65c.	1.20	1.80	2.30
28	2,063	45c.	80c.	1.50	2.25	2.95
35	10,100	....	....	1.85	....	3.60

Also carried in three, four and five-pound spools. Use rate for 2 lbs. in computing cost. Shipping weight one pound on all amounts in less than pound lots. Shipping weight on lots from one to two pounds, two pounds. Shipping weight on two pounds, three pounds. Prices quoted on any size and insulation.

Enamel insulation is of a higher quality than silk or cotton; more turns can be wound per inch, and there are more feet to the pound. Our wire is guaranteed in every respect.

Number 16 wire is suitable for primary winding and Number 35 for the secondary winding of a ½ K. W. wireless transformer. Number 35 can be used on high power spark coils. Pure soft drawn copper aerial wire, bare, No. 14, per pound, 45 cents. Two pounds 85 cents. Shipping weight, two and three pounds, respectively.

A few pounds of No. 14 soft drawn D. C. C. copper, new, insulation perfect, but soiled in shipping. Per pound, 85 cents. Two pounds \$1.60. Shipping weight, two and three pounds, respectively, etc.

Postage on all Sizes Must be Included Except in First and Second P. P. Zones

SPECIALTIES MFG. CO., 1436 12th Ave., San Francisco

WASHINGTON'S BIRTHDAY RELAY

(Continued from page 251)

get full credit for their co-operation and efficiency of their sending stations.

Traffic Manager H. Schnell will instruct the following stations later to handle M.S.G. East to West and the idea being to have short jumps so all may hear them. The District Superintendent of each A.R.R.L. district will Q.S.T.—M.S.G. through his entire district after traffic has been cleared but not indulge in any unnecessary traffic of course.

Message West to East will be pushed as fast as possible through the different routes below and in case of interference—keep incessantly at it.

Sending Stations For Relay

1 AW—2RK or 2JU—3DH, 3XF or 3KM, 3AEV or 3BZ, 5DA or 4AG or 4YB—5ZP or 5YH, 5ZC or 5ZG, 5ZA, 6ZH or 6JT, 6 BZ or 6BQ, 6ZK, 6KP or 6JD or 6JM going West.

8ZW, 8ZL, 9ZN, 9JN, 9ZL, 9HT, 9ZC, 9ACF, 9UP, 9WU, 6ZH, 6JT, 7IM, 7CC, 7FT, 6BZ, 6BQ, 7ZB, 7BP, 7DA, 7ZJ—Going West.

6ZE, 6BZ, 6BQ, 6ZH, 6JT, 9ACF, 9 UP, 9LR, 9HT, 9KV, 9LC, 9JN, 9ZN, 8ZL, 8ZD, 9ZJ, 8ZY, 8ZW, 2RK, 1AW—Going East.

Above stations may not all send as calling station may decide to shorten route used and this all depends on decision of Traffic Manager H. Schnell and District Superintendent of that district.

The Illinois Watch Co. of Springfield, Ill., will send out each night during February after their time and weather report—information about the relay. Listen for it. They have also donated a dandy "Illinois" watch, so some of you late birds can win a prize and go to bed some night on time.

Last—keep quiet—listen—deliver M. S. G. Follow instructions, mail it in and sit tight—watch the magazines and see if you are a winner.

Cordially,
W. KIRWAN,

Box 148, Davenport, Ia.

Any commercial operators on ships at sea will confer a favor on the whole amateur body by sending in a good report in detail.

**Are you a subscriber?
You should be.**

NO TUBES SOLD

without complete instructions for operating efficiently.

ELECTRON RELAYS and A-P AMPLIFIERS

personally tested on actual receiving. A new tube or your money refunded if you are not satisfied.

For prices see front cover of this magazine.

B. F. McNamee
2436 Stuart St., Berkeley, Calif.

FINANCIAL NEWS

Moorhead Co. Closes Contract With Marconi, G. E. and Am. T. & T.

Moorhead Laboratories of San Francisco, which operates the largest factory in the world devoted exclusively to the manufacture of vacuum tubes, closed a most important contract with the Radio Corporation of American (Marconi), the General Electric Company and the American Telephone & Telegraph Company, granting a patent license under the Fleming valve and DeForest audion patents.

Federal Wireless Bonds Are Sold

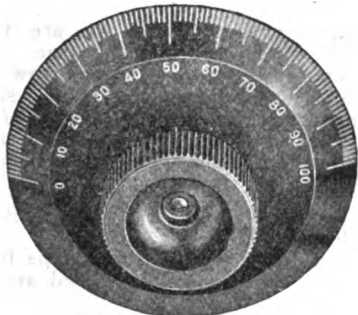
More than \$300,000 worth of the Federal Telegraph Company's first mortgage 8 per cent serial gold notes, of which \$500,000 worth were placed on the market, have already been sold, according to Girvin & Miller, Pacific Coast bond firm, who is handling the issue in Los Angeles. These notes will be secured by an absolute first closed mortgage on all of the property of the company now owned and hereafter acquired, consisting of wireless stations in San Francisco, Portland, Los Angeles and San Diego, together with a factory at Palo Alto, which manufactures the wireless equipment.

Unlisted Securities

	Bid	Asked
Moorhead Laboratories.....	\$0.24	\$0.25
National Radio .....	.19	.20
Poulsen	2.00	2.50

San Francisco Stocks

Federal Telegraph Co., Feb. 4.....\$6.00

**"CHELSEA" BAKELITE DIAL No. 1**

The Chelsea dials are made of genuine bakelite, beautifully finished, and bear a 100 division semi-circular scale. This scale is of white characters and so constructed as to be both deep-set and sharply defined. These divisions and characters are permanent and will neither wear off nor fall out.

The dial is $3\frac{1}{4}$ inches in diameter, $\frac{1}{4}$ inch thick, with a long, sloping, easily read marking. The knob also is of bakelite, $1\frac{1}{2}$ inches in diameter, with a fine, straight knurled edge, which greatly aids the making of fine adjustments. These two parts are permanently fastened together by a long brass bushing which also serves to carry the set screw for attaching to the instrument shaft, and, more important, to give perfect alignment in use. Chelsea bakelite dials run true, and will not warp.

Dials only, without knob and bushing, are furnished with our well known elongated hole, and may be placed upon any of our unmounted condensers now in service.

The complete dial and knob is made to fit either $3/16$ inch or $1/4$ inch shaft. Specify size when ordering, otherwise the $1/4$ inch hole will be furnished.

Panels equipped with our circular dials are both easier to operate and more attractive.

Chelsea dials are beautiful in appearance, low in price, accurate and durable in service, unexcelled by any, at any price.

Dial only\$0.75
Dial and knob complete..... 1.00

Purchase from your dealer.
Bulletin sent upon request.

CHELSEA RADIO COMPANY

13 Fifth Street Chelsea, Mass.
Manufacturers of Radio Apparatus.
Moulders of "Bakelite."



Your Dealer's Salesman Will Show You — "BALDY" Phones

Ask him to open up one unit.

You'll see the equivalent of a phonograph reproducer in conjunction with the famous Baldwin balanced armature movement.

You'll see why it costs more to build one "Baldy" unit than a complete headset of ordinary design.

You'll see why a pair of Baldwins often equal one and two stages of amplification—why you cannot afford to be without them.

Type C, \$16.50 (1-unit, \$8.50); Improved Type E, \$20.00 (1-unit, \$10.00); Type F, \$21.00.

Baldwin headbands fit most types of phones, \$1.75.

Described fully in booklet R1.

Eldredge Meters

They are actually *hand-calibrated* to absolute accuracy—yet, are low priced.

All ranges in flush type finished in highly polished nickel. They match one another and are the neatest and most accurate miniature meters made.

Hot wire type 0-600 M. A., 0-1, 0-3, 0-5 amps., \$7.00.

D. C. and A. C. meters in many ranges as shown in booklet R3.

Brownlie Adjustable Phones

If you can't afford a pair of Baldwins this season, we recommend Brownlies.

Ask the salesman to remove one ear cap.

You'll see, among other things, the 8 supporting springs, the 1000 ohm solenoid under the exact center of the diaphragm.

One professional operator says about his Brownlies:

"I find it possible to cut out interfering stations by making a slight adjustment. I was anchored at Paagamene, Caledonia, and copied Balboa time sigs—approximately 7000 miles—on one audion."

"Letter on file."

Brownlies are sensitive, light in weight and rugged.

Price complete with Baldwin Headband, \$12.50. Loud speaker unit with cord, \$6.00.

Described fully in booklet R2.

If your dealer cannot supply you, write direct, giving his name and address. We will gladly supply you with literature and tell you where you can see the entire line.

JOHN FIRTH & CO., Inc.

18 Broadway - - New York

Sole distributors of

Eldredge Measuring Instruments.

Kolster Decremeter.

U. S. Bureau of Standards Wavemeter.

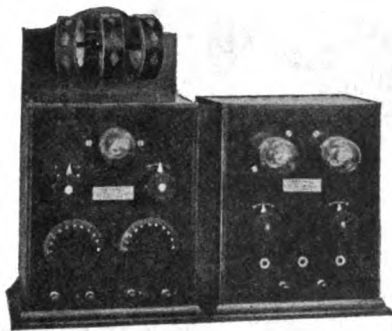
Navy Standard Leyden Jars.

Brownlie Adjustable Telephones.

Firth Wireless Products

REYNRAD SPECIALTIES

SUPERIOR RECEIVING EQUIPMENT



RR-74 and RA-72

REYNRAD SHORT WAVE COILS

Just what you have been looking for. Single Layer inductances, wound on heavy 4-inch Bakelite tubes, with standard De Forest plugs. A set of three will bring in amateur stations as you never have heard them before. An additional secondary coil will make your receiving outfit equally efficient up to 600 meters. State wave length desired, 175-300 or 300-600.

Reynrad Short Wave Coils.....\$2.00 each
Standard De Forest Plugs for H. C. or D L Coils\$.65 each

We carry a large stock of Standard apparatus and supplies. Acme, Murdock, Clapp-Eastham, Magnavox and De Forest Agents. Send 6 cents in stamps for catalog and we will also place you on our mailing list.

Correspondence Solicited
REYNOLDS RADIO SPECIALTY CO.,
729 South Prospect Street
COLORADO SPRINGS COLORADO

The Reynrad RR-74 Multiwave Tuner and Audion Detector is an exceptionally fine receiving outfit mounted as a cabinet unit and within the reach of all. When used in conjunction with our RA-72 Two-Step Amplifier at our Testing Station, music and Radio Phone conversations have been heard from both coasts—an exceptional record.

With our RCR-30 complete receiving set, ships have been readily heard over a distance of 1500 miles, mostly overland and amateurs copied over 1000 miles away. These receiving records place the Reynrad RCR 30 on a par with numerous audion sets.

These instruments are compact and artistic in design.

RR-74 Multiwave Tuner and Detector with bulb only.....\$60.00

RA-72 Two-Step Amplifier, with bulbs.....\$55.00

RCR-30 Crystal Receiver Set, with 3000 ohm Phones\$30.00



RCR-30, CRYSTAL SET

THE FALL OF SAMUEL JONES

(Continued from page 254)

for a mislaid back collar button; not finding it, he desperately stuck his collar on without it. Throwing an army half-hitch into his necktie, he grabbed his hat and sallied forth. Striding down the gangway, he hurried to where Evelyn Campbell stood waiting for a steward to bring her suitcases ashore.

As Samuel Jones came rushing up, he suddenly noticed that a hard and solid-looking male person was standing near his fair Evelyn. From photographs that the chief wireless operator had seen in a sporting paper, he instantly recognized the fellow as Battling Bob Campbell, a Western heavy-weight slugger, with a record for one-round knockouts. Was he Evelyn's brother—?

"Oh, Bob, meet Mr. Jones," exclaimed Evelyn, smiling graciously upon Samuel, who had halted, uncertainly. "He is the chief radio man of the 'Wapama,' and he has been awfully nice to me—"

"Glad to meet yer," growled the husky prize-fighter, extending a wicked looking paw.

Gingerly, Samuel Jones put out his hand, and it was crushed in an iron grip that made the chief operator bite half through his tongue.

Evelyn Campbell put one dainty little gloved hand up on the boxer's broad shoulder, in an unmistakably affectionate manner, and smiled sweetly upon poor Samuel.

"This is my hubby," she said, naively.

History repeats itself, we are told, and this often seems to be true. Another cloudy autumn afternoon saw the "Wapama" pull away from that same pier in San Francisco, and, shortly afterward, another sweet young damsel came tripping along to the wireless-room door.

"O-o-o-o-h! Here's the wireless!" she cried, enthusiastically. "Please, may I come in, mister man?"

Samuel Jones slammed down the book that he was reading and twisted around in his chair.

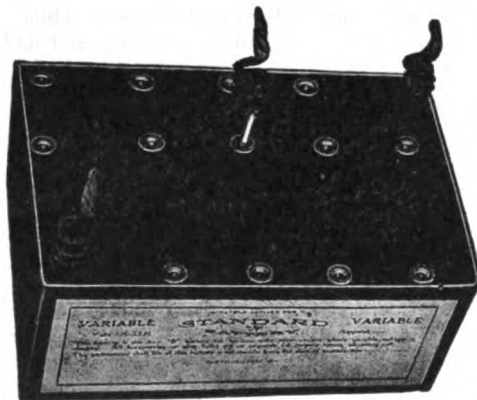
"No, you can't come in!" he snapped, shortly and sourly. "It's against orders an' it's against the law, an' it's a ten thousand dollar fine an' fourteen years in the penitentiary; so get away from here an' stay away from here!" He glared, savagely.

With a gasp of terror, the fair one fled.

Disdaining to notice a clearly audible snicker from the top bunk, Samuel Jones turned back to Sir Sigismund Mugfoot's adventures in Bonga Tonga, and read how that intrepid adventurer slew three hundred blood-thirsty cannibals single-handed, by throwing red pepper at them until they sneezed themselves to death; after which he bound their hideous wives in rattan and drowned them all in a lake.

(The End)

Gaseous Content Vacuum Tubes



Type No. 7650

(Pat. Pending)

Require a variable high voltage, accomplished either by potentiometer or by a "B" battery, each cell of which is tapped off—THE VARIABLE STANDARD VT BATTERY.

For convenience of variation, method and efficiency, to say nothing of length of service, there is no "B" battery at any price that can approach the VARIABLE STANDARD VT BATTERY.

Reputable dealers call the STANDARD VT BATTERY, made in three types—Type No. 7623, \$1.50—Type No. 7625, \$2.65—Type No. 7650 (Variable), \$3.50—each unit of 22½ volts.

RICHTER-SCHOTTLER CO., MFRS.

198 ROEBLING ST. Dealers—Write for Discounts BROOKLYN, N. Y.
PACENT ELECTRIC CO., Sole Eastern Agents, 150 Nassau St., New York City

CRASH!

20% DISCOUNT ON THE FIRST FIVE

!BANG

Order from each city of one or more of our Type V1R complete vacuum tube receiving outfits on genuine Formica "Hi-Grade Special" panel complete with H-C coil mounting, rheostat, grid leak, grid cond., socket, 23 plate var. cond., etc. Connections soldered to lugs under machine screws, covered with insulating tubing. Only \$16 less 20%; without var. cond. \$12 less 20% P. P. Same discount allowed on all types. Stamp for full list. Cash or one-third with order, balance C. O. D.

HI-GRADE WIRELESS INSTR. CO., ASHEVILLE, N. C.

ROTARY GAPS

110 Volt, A. C. or D. C. Motor
Bakelite Disc, 10 Stud Rotor. Cord and
Plug Attachment, \$12.00.

RADIO DEVELOPMENT CO.

P. O. Box 2114 San Francisco, Cal.

RADIO FOR LIFE SAVERS ASKED

GOVERNMENT wireless apparatus is to be installed at all stations of the coast guard along the Pacific Coast as a further means of quick assistance to vessels in distress and for the protection of life on wrecked vessels if a petition of local shipping interests is heeded in Washington.

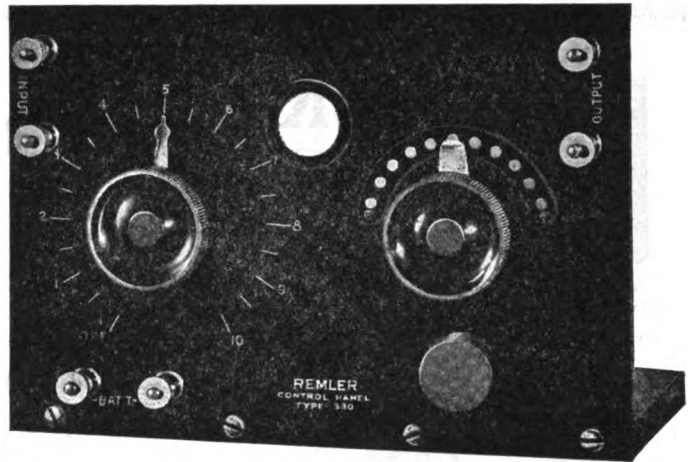
The wreck of the steamer "Klamath" is cited as an example of inadequate means of protection for coast vessels. Due to the hurricane which swept the coast and drove the Klamath ashore at Del Mar all telegraph and telephone lines in that vicinity were down.

Communication between this port and the Point Arena life guard station, only twenty miles north of the wreck, was interrupted. As a result the life guards at Point Arena did not know there was a wreck until twenty-four hours after the passengers had been saved, it is said.

Wireless sets at each coast guard station would permit the life savers to pick up the "S. O. S." calls and render prompt aid.

District Superintendent of the Coast Guard Captain Peter Jensen said that the installation of wireless equipment at these coast guard stations would be invaluable.

It was pointed out that the government has much wireless equipment at coast navy yards which was purchased during the war and which could be utilized.—S. F. "Examiner".



Remler Type 330 Vacuum Tube Control Panel For New Type C-300 Detector Tube

Maximum Value and Quality Through Quantity Production

THESE SPECIFICATIONS SPEAK FOR THEMSELVES

Genuine bakelite, highly polished, 5x7¼ inches. White filled engraving. Special smooth running rheostat back mounted. All bakelite VT socket. The new Remler positive metal contact potentiometer for controlling plate voltages from A Battery. Variable grid leak. Fixed grid condenser. Busbar wiring.

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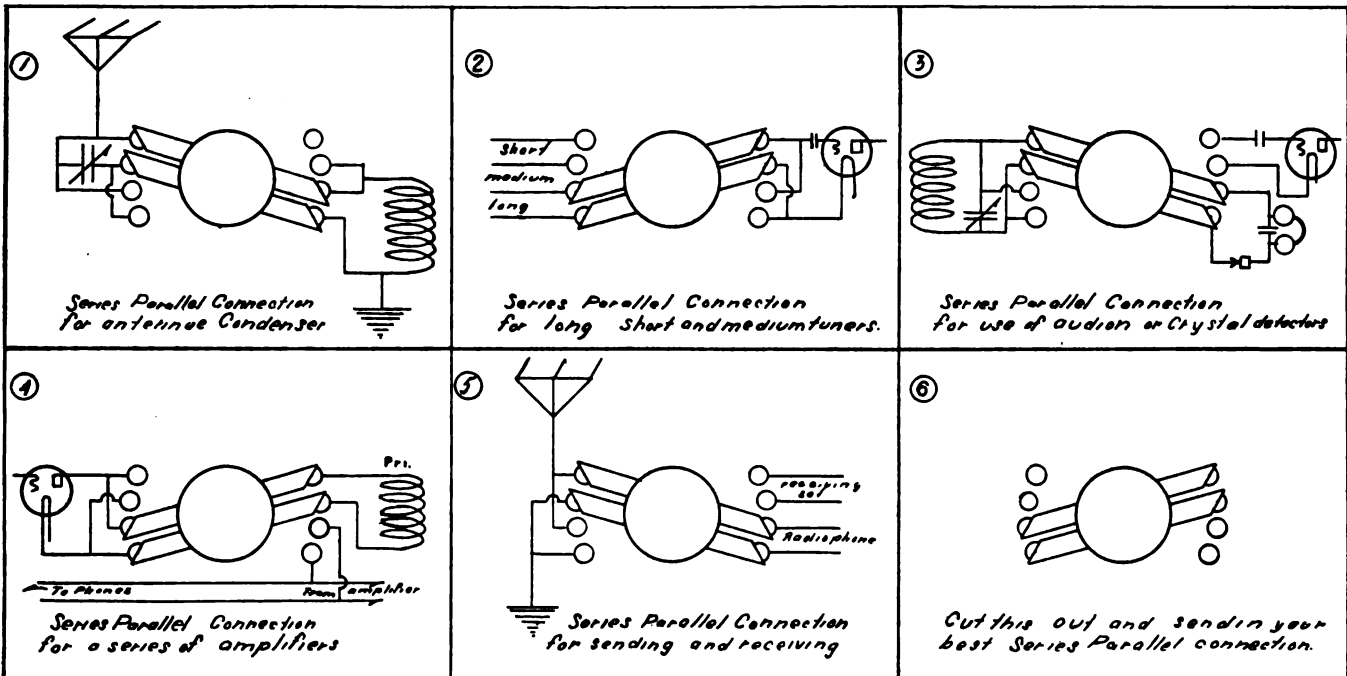
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To take advantage of our offer announced on the inside page of back cover

THE RADIO TELEPHONE SHOP PRIZE CONTEST



This drawing shows the use of Pen Brand Series-Parallel Switches for five different circuits. The drawing in the lower right hand corner is to be filled in with an original circuit for the use of the switch. Send us your answers immediately. Contest closes March 5th. Winners will be announced in the next issue of this magazine. The following prizes will be awarded:

FIRST PRIZE—1 Pen Brand Series-Parallel Switch (Value \$1.25)
1 Pen Brand Pony Rheostat (Value \$1.10)
1 Pen Brand Grid Condenser (Value \$1.00)

Second Prize—1 Pen Brand Series-Parallel Switch.

1 Pen Brand Grid Condenser.

Third Prize—1 Pen Brand Series-Parallel Switch.

The Radio Telephone Shop

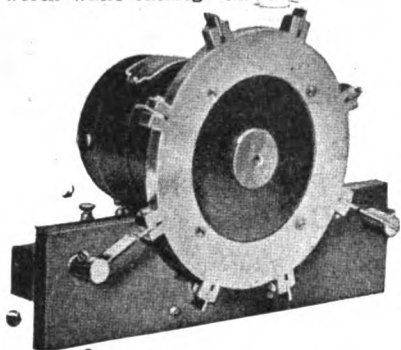
175 Stuart St., San Francisco, Calif.

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DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

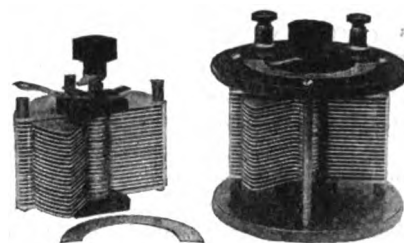
has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio



THE "ILLINOIS" VARIABLE CONDENSER

The Condenser with "Star Spring" Tension

MADE RIGHT - STAYS RIGHT
Hard Rolled Aluminum Plates

These condensers are made by a watch mechanic, schooled in accurate workmanship and who can't get over the habit of critical inspection.

Three Styles: No. 1, Panel; No. 2 Open Type as shown; No. 3, Fully Encased. Anti-Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No. 1	No. 2	No. 3
67 Plates	.....\$7.00	\$	\$
43 "	..... 3.50	4.50	4.75
23 "	..... 2.75	3.75	4.00
13 "	..... 2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured P.P. With Style No. 1, we will, if desired, furnish 3 inch Dial with large knob, instead of Scale and Pointer. Extra Price 75 cents.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

Kindly note: We issue no Catalog, and make no "trade discounts." We set our prices at the lowest limit, and leave the "middle man" out for the sole benefit of the "consumer."

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Amateurs to Secure Subscriptions

PACIFIC RADIO NEWS

Pacific Radio Pub. Co.
50 MAIN ST. SAN FRANCISCO

WIRELESS and Kindred Science Revolutionized!

Whether or not you believe in the present electro-magnetic and valve theory of wireless, you should read my book "Revolutionary Theories in Wireless," and I believe you will agree with me that electro-magnetic waves are not the dominating cause for wireless transmission and that we have no valve or rectifying detectors in use at present.

After you read this book you will understand wireless and wireless apparatus from a different angle than you have ever read before. The only book in print advancing the conductive theory of wireless transmission, the valveless theory of detectors, the new attractive theory of electricity, etc. Among the many new ideas advanced are thermo-coherers, thermo-microphones, vacuum microphones, electrostatic receiver, earth primary and secondary battery, improved electrolytic interrupters, how to fly by manual power and secret of soaring. This book will doubtless prove the key

to many of the mysteries of gravitation, life, magnetism, electricity, light, chemistry, and kindred science.

Get on the right track in your study and experiments in wireless.

I have been highly complimented on my book by The Experimenter Publishing Co., The International Society of Radiolists, Joseph Branch Publishing Co., and others.

Above book is bound in full cloth, has 200 pages, 72 illustrations, and 129 intensely interesting articles on science and describing by the Summers' theory all the most used wireless apparatus.

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Here is a combination that gets fine results for everybody that uses it.

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Special introductory offer

This combination sent anywhere in the U. S., postpaid, for \$6.00. Send your order today. The coils will be shipped immediately, and you can start right in on your long range work.

Kelly and Phillips

312 Flatbush Ave., Brooklyn, N. Y.

THE EDITOR'S MAIL BAG

(Continued from page 261)

and the receiving of a reply from that station is absurd on the face of it. As for Spain and Portugal, my experience with radio in those countries is such that I would seriously doubt the ability of Spanish or Portuguese operators to hear anything more than a couple of hundred miles away, let alone recognize the source of the conversations referred to in Mr. Axe's statements.

Let us hope that there are no more reports such as the one mentioned above, as it is very misleading to the public and casts discredit on the amateurs repeating such things to the newspapers, who are only too ready to publish anything of a sensational nature.

Very truly yours,
G. M. BEST (6JX).

Here is the clipping from the San Diego "Union" that deals with the communication between Annapolis and Avalon:

**ANNAPOLIS-AVALON RADIO
PHONE TALK HEARD BY AMATEUR**
Escondido "Listens In" and Hears
Maryland Station Operator's
Words Clearly

(Special to The Union.)

ESCONDIDO, Jan. 19.—Frank Axe, president of the Escondido Radio Club, while "listening in" with his wireless equipment at his home, two miles north of the city, had the interesting experience last evening of hearing a conversation between the operator of the commercial radio phone station at Avalon and the radio operator at the naval station at Annapolis, Md., and of hearing the operator at Annapolis tell the operator at Avalon that his message had been heard by operators at stations in Portugal and Spain.

A R C RADIO MANUAL

THE ONLY BOOK
OF ITS KIND ON
THE MARKET

Compiled by the Engineers of the
Federal Telegraph Co. of San Francisco

Written in a Non-Technical Man-
ner. Any Amateur can
Understand It.

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RADEQ AUDION CONTROL PANELS

The best control panel for the money; has polished formica panel mounted on oak base and equipped with tube socket, grid leak, condenser, rheostat, and nickel-plated binding posts. Price without B batteries or tube, \$10.00.

Wireless apparatus made to order; sets designed to use material you now have on hand. Send for price list.

A. C. PENFIELD, Conneautville, Pa.

ACME ANTI-LIGHT BLINKER

The Acme Apparatus Company has devised a method for eliminating the blinking of lights when sending telegraph code with spark transformers.

This apparatus will help amateur radio by stopping the complaints from neighbors and power companies.

One-half Kilowatt \$5.00 One Kilowatt \$7.50

Both sizes equipped with $\frac{1}{4}$ and $\frac{1}{2}$ power steps.

Write for Bulletins

ACME APPARATUS COMPANY

21 Windsor Street, Cambridge 39, Mass.

Transformer and Radio Engineers and Manufacturers

Resonance Tuner -- Something New -- Used with Bulb Only

Built on the resonance principle of the new Coils of the U. S. Signal Service. It is a wonder tuner and is wound with pure copper strip with split phase coil inside and out of the winding. IT GETS ALL THE 200 meter stations going and the tuning is done merely with a 21 Plate Condenser in series with the aerial.



Amplification up to 100 times with variometers in series with grid and plate. This tuner will permit you to make a regular paragon at a very small price.

It is truly the wonder tuner and will revolutionize the tuner industry. These have been tested everywhere before being offered to the Amateurs and we will absolutely guarantee every one. Special price—one to each city \$6.00, add parcel post.

TRESCO, Davenport, Iowa.

Send 10c. for
16-page Catalog

"The Radio Telegrapher"

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Room 303

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Read about what's going on among the Commercial, Navy and Army operators

ON SHIPBOARD
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Moulded of "INSULATE"
(best substitute for hard rubber)
or
"HI-HEET" (resisting)
(synthetic material.)

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AMRAD COMPANY TO GIVE QUENCHED GAPS TO AMATEURS

IN order to help reduce QRM by the more extensive use of quenched gaps and low power, the American Radio and Research Corporation is offering free during the month of March, one Amrad $\frac{1}{4}$ K. W. Quenched Gap with every induction coil. This offer is particularly directed to relay men and is intended to give tangible proof of the performance of this combination in actual use.

A schedule of broadcasts has been arranged for every Wednesday and Saturday during the duration of the special offer. Most of the stations listed below will use both the quenched gap and induction coil. In addition, some of the stations will employ an Amrad Coil for I. C. W.

The stations which will send out the QST messages every Wednesday and Saturday during March follows:

1 XE	.....	4:30 p. m.
1 GY	.....	9:00 p. m.
1 OJ	.....	9:10 p. m.
1 AK	.....	9:20 p. m.
1 FW	.....	9:30 p. m.
2 CX	.....	9:40 p. m.
2 PL	.....	9:50 p. m.
3 EM	8:50 p. m.
8 AIW	9:10 p. m.
		C. S. T.
8 ZZ	9:15 p. m.
5XG	9:30 p. m.
8 HG	9:45 p. m.
9 ZH	9:50 p. m.
		P. S. T.
6HI	9:30 p. m.

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Also New Apparatus and Supplies.
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Send for list of used Apparatus.

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Send for the booklet to-day. You'll find it interesting.

WIRELESS EQUIPMENT CO., Inc.
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"Arc" and "Spark" Systems

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Send for Descriptive Circulars

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The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

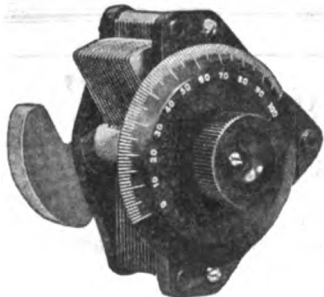
Let us show you how our standard products can be made to solve your insulation problems.

THE CONTINENTAL FIBRE CO.
NEWARK, DELAWARE

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CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No. 1—.0011 m.f. mounted\$5.00
No. 2—.0008 m.f. mounted4.50
No. 3—.0011 m.f. unmounted4.75
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Bakelite Dials only75

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

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Manufacturers of Radio Apparatus and Moulders of Bakelite.

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BURGESS BATTERY COMPANY
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RADIO SHOP VARIOMETERS..... \$5.75

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Wood that will not shrink and the same wonderful bearings that originated in RADIO SHOP VARIOMETERS.

Send your order in early and take advantage of this offer.

The Radio Shop

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AN
**EVEREADY
PRODUCT**

Guaranteed 45 volts
Six Taps

**\$5.00 prepaid anywhere in
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We also build any type of set to
order. Send us your specifications.

Ets-Hokin & Galvan

Wireless Engineers
10 Mission Street San Francisco



**QRK? Very QSA, O. M.—
Am using a K52 Short Wave Set**

WE CARRY A COMPLETE LINE OF PARTS FOR SHORT WAVE
SETS, AS WELL AS EVERYTHING YOU WANT IN THE
RADIO OR ELECTRICAL LINE

WRITE FOR BULLETIN P15

DAVID KILLOCH CO.

57 MURRAY STREET

NEW YORK CITY

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EVEN TO THE PACIFIC COAST!

Sorala V. T. Socket (Bakelite Base)....\$1.10
Paragon Rheostat (with Bakelite Chelsea Knob)..... 1.75
G-R "A" Battery Potentiometer (reversible for panel or table use)..... 4.40
22 V. Adjustable Eveready "B" Battery 2.00
Radiotron U. V. 200 Detector VT..... 5.00
Paragon VT Control Panel..... 6.00
Type J 0-3 Filament Ammeter..... 7.00
Chelsea No. 3 Panel Condenser..... 4.75
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Bakelite Dials, Separate, 3/4 Inch D.... .75
Bakelite Dial with Knob Attached..... 1.00



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WE HAVE THEM
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STANDARD PRODUCTS
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ALWAYS!
4c puts you on our mailing list.

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Written by one of the foremost radio men in America. Edward E. Jones, Radio Editor Experimental Science Magazine.

Other features: Construction of apparatus; new hook-ups; articles on electricity, chemistry, physics and science in general.

Each issue puts it over on the previous one.

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EXPERIMENTAL SCIENCE PUB. CO., Inc.

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Buy your goods from the dealer who is a member of the National Association. Take no chances! The Association is backing the dealer and you should back him in return. You will never suffer a disappointment if you leap before you look.

ACT NOW!

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Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA
Phone Douglas 3030 335 New Call Bld., San Francisco

SIBERIA EXPEDITION (Continued from page 250)

house with lines leading under ground to the tanks and engines.

The station was completed in the early spring of 1919 and communication was immediately established with Cavite, P. I., and later with St. Paul, Alaska, and Cordova, Alaska. Messages were also transmitted to a French station near Irkutsk, Siberia, about two thousand miles inland along the line of the trans-Siberian railroad.

Due to the fact that the telegraph lines between Vladivostok and the interior were constantly being cut by the Bolsheviks, or other factions, this overland service proved to be of inestimable value to the French and Czecho-Slovaks who were carrying out military operations as far back as Omsk, approximately four thousand miles inland.

Phenomenal results were obtained in receiving the world's high power stations. Press was copied daily from Lyons, France; Nauen, Germany; Rome, Italy; Washington, D. C., and San Francisco, Calif. The press was published by the American Expeditionary Forces at Vladivostok and circulated in mimeographed form. It was free to the Russian newspapers free of charge, translated and published in the Russian language.

Instances were known where information by radio preceded the cable by fifteen days.

The normal current used through the arc was approximately 80 amperes on 7,000 meters, the maximum current being 100 amperes, which was rarely used.

Most of the work was conducted on wave lengths between 6,000 meters and 8,000 meters, although the station could transmit on as high as 11,000 meters. The 6,000 meters wave was found advantageous for receiving at Cavite, P. I., where heavy static is almost a daily occurrence.

Although the Vladivostok station is equipped with only a 60 K.W. Poulsen arc, the signals have been copied at phenomenal distances, on one occasion by a ship entering San Francisco harbor.

HAVE YOU SENT

For a copy of the Arc Radio Manual? It's a dandy. \$2.50 per copy, postpaid.

PACIFIC RADIO PUB. CO.
San Francisco, Cal.

RADIO CLUB PINS

Special folder of designs and prices in addition to regular catalogue free on request.



Be sure to see these new numbers, which will put new life in your club

METAL ARTS CO. Dept. 9 Rochester, N. Y.



Paragon Rheostat

has become the standard filament resistance. For back of panel or table mounting. 2 1/4-in diameter. 6 ohms., 1 1/2 amps.

\$1.75 Postpaid
Immediate shipment.

Standard VT Socket \$1.00. Why pay More?

44 Volt Variable "B" Battery, \$3.60

Include Postage on 4 Lbs. Complete in handy wooden case and adjustable phosphor-bronze "Jiffy" connectors. Better than block batteries! If one 4.4 V. unit weakens prematurely, it can be removed and replaced, thereby not impairing the total voltage—making this the best battery value on the market.



Audiotrou Adaptor

Consists of standard 4-prong base with brass supporting connectors. Permits mounting tube in vertical position, so filament will not sag and touch grid.

\$1.75 Postpaid
Aerial Wire 1c Per Foot
7 strands No. 22 solid copper—tin plated to prevent oxidation. Include postage on 15 lbs. per 100 feet.

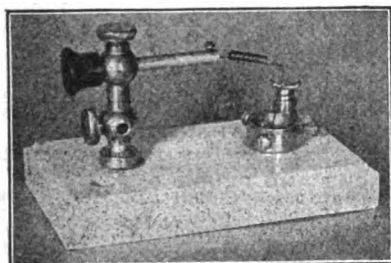
Lightning Switch, \$4.00
600 volts, 100 amps., S.P.D.T.

Radio Equipment Co.

630 Washington St.
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Attention WIRELESS AMATEURS

THE ONLY WIRELESS MINERAL
DETECTOR MADE ON A SOLID
PORCELAIN BASE. See Cut



This Mineral Detector is a most valuable device to eliminate the Amateur's troubles in Wireless Operating

PRICE \$2.25 EACH

Including Parcel Post Charges

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Stratton Electric Company

We carry a line of Wireless Material, Parts, Small Instruments and Educational Books.

Murdock V.T. Socket.....\$1.00
Chelsea Oscillator.....\$3.00
Chelsea Variable Grid Leak.....\$3.00
Shipping weight 1/4-lb. each. Add postage.
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DEMONSTRATIONS recently given with Kennedy Receiving Equipment before the San Francisco Section of the American Society of Mechanical Engineers and the San Francisco Engineers' Club caused great astonishment on account of the wonderful reception of long and short wave signals from both near and far.



TYPE 100 LONG WAVE REGENERATIVE RECEIVER
Licensed under Armstrong U. S. Patent No. 1,118,149

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EQUIPMENT**

IF you are interested in long range records, as well as consistently superior everyday performance, you should have Kennedy Equipment in your station.

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BUY it from us direct if your dealer can't supply you with Kennedy Equipment. You take no chances. If you are not satisfied after 5 days' trial, send it back to us and we will refund your money. Catalog and price list of accessories on request.

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INCORPORATED

RIALTO BUILDING

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SOMETHING NEW IN HEADSETS



"Navy Type, 50,000 Ohms, A. C., Weight 9 oz., complete with head band and polarity indicating cord.
Price \$14.00

Send 5c for Catalog "C"

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The improved Navy is peculiarly adapted to vacuum tube reception.

They are permanently adjusted at their highest point of efficiency and then carefully matched in tone. Because of their rugged construction they remain adjusted indefinitely.

The most exacting comparative tests have convinced us that our High Impedance Navy Type Headset is the best on the market, regardless of price. It is the most sensitive, most durable, and at the same time the lightest high-grade headset built. Our guarantee stands back of every one of these claims.

If you need a reliable and super-sensitive headset, you cannot afford to be without this new high impedance model. Send us \$14 and we will mail you a Navy Type Headset. Try it for 10 days. If you are not absolutely satisfied with your purchase, return the headset and we will refund the money immediately.

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Room 819, 32 Union Square, New York City

Also makers of: Trans-Atlantic Headsets, \$12.00.

Superior Headsets, \$8.00.

TYPE 156

VACUUM TUBE SOCKET



Adapted for transmitting as well as receiving tubes. Change over is made by means of two screws in base. When set for one position protection is provided against use of tubes for other position.

POSITIVE CONTACT SPRINGS
RUGGED ATTRACTIVE RELIABLE
PRICE \$1.75—SEND FOR BULLETIN 904C

GENERAL RADIO CO., Cambridge 39, Mass.

Averaged 82% out of a possible 90%

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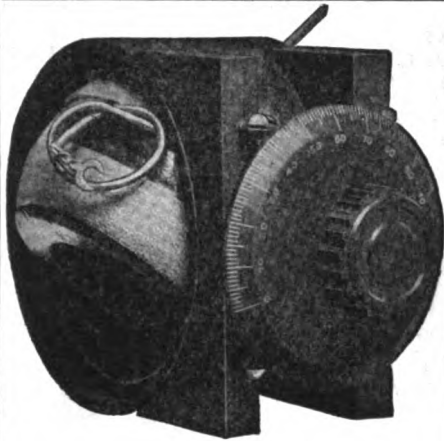
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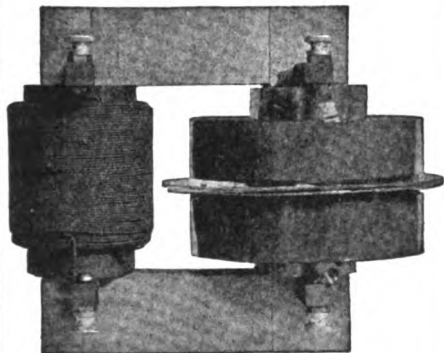


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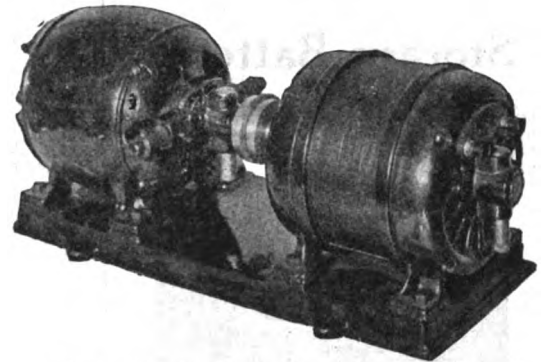
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obligation incurred under it.—S. F. "Call."

(Continued from page 252)

munications for the construction of one Shanghai plant. The British allege that it violates the government's contract with the Marconi company, which gives the latter concern a virtual monopoly on wireless construction in China.

Charles R. Crane, American minister to China, through Dr. W. W. Yen, the foreign minister, has suggested that cancellation of the contract with the Federal company be deferred, pending direct negotiations, which the Washington administration is said to be taking up with the British Government.

Important to U. S.

Crane feels the question is most important, according to the cablegram, as bearing on future American efforts toward direct intercourse with China.

Japan, which lodged a protest in January against the Federal contract on the ground that it infringed rights acquired two years ago by a Japanese company, has made an additional protest, while Denmark also has lodged one, alleging infringement.

The attitude of the Chinese foreign office, as unofficially expressed, is that the British and American contracts were executed by different departments of the government with different aims, hence there is no conflict. With regard to the Japanese contract, it is alleged the Japanese have not fulfilled the terms of the contract and thereby have relieved the ministry of communications from

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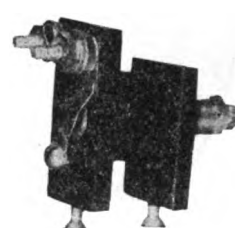
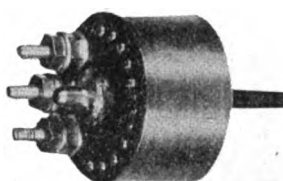
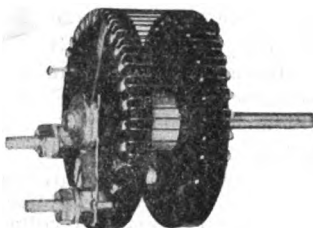
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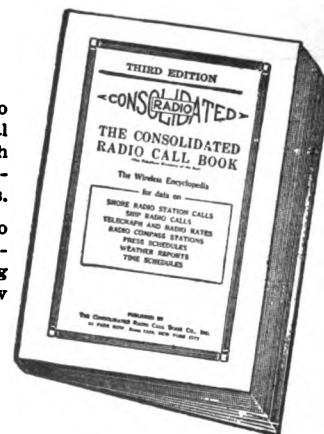
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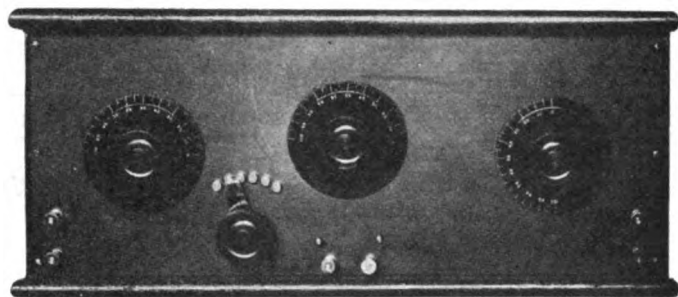
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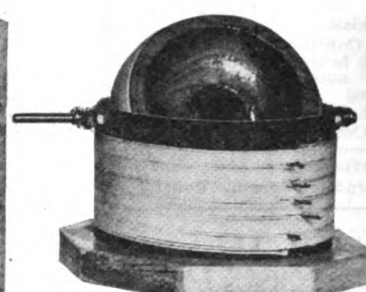
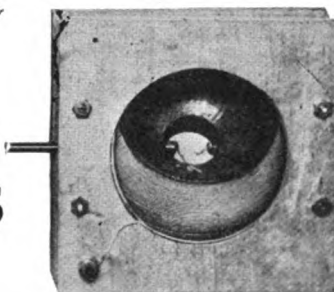
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THE RADIO MAGNAVOX is manufactured under the same patents and on the same electrodynamic principle as the Magnavox Radio Telemegafone, and will reproduce signals with the same volume.

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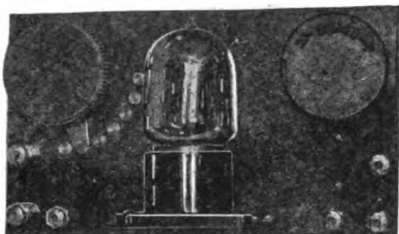
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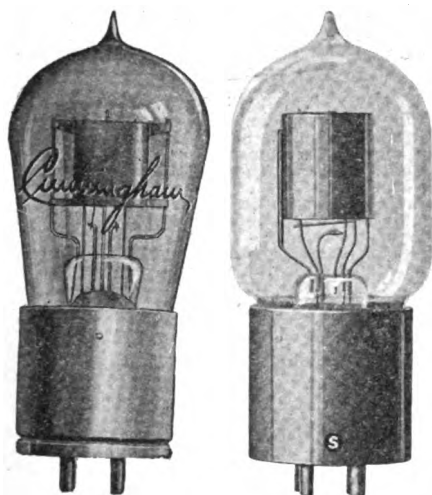
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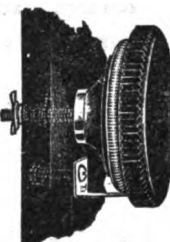
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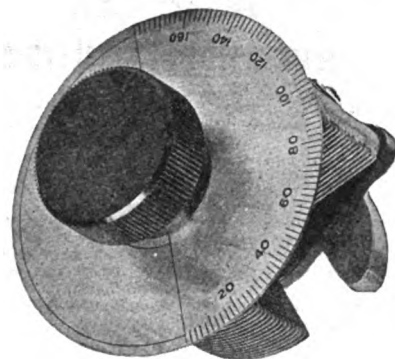
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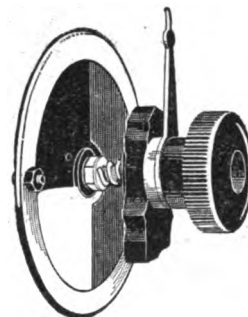


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RADIOTORIAL

BY H. W. DICKOW



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HELP WANTED!

MANY communications have reached us from progressive amateurs who ask our help in enabling them to get their C.W. signals into the air. The old-reliable spark gap has not left us in spite of the ever-increasing number of tube sets coming into operation. The amateur who has used the spark for the past few years will not throw it in the discard in favor of a C.W. set until he can safely rest assured that other stations will hear undamped signals without necessitating the present system of long and continuous calling.

The spark is a valuable asset to C.W. work of the present day. It is usually necessary to call a station with the spark to inform the "party on the other end of the line" that C.W. signals are to be transmitted.

Amateurs will not take the trouble to do a little tuning for C.W. stations. The coupling of the tuner is set in a fixed position and it remains there until the cows come home. Sharp tuning is necessary to get those signals. We have heard C.W. stations call distance amateurs time and again without result. Closer co-operation is necessary among the amateurs of the West in order to realize the utmost of pleasure and benefit from their equipment.

Why not do a little tuning for C.W. stations and add a few more records to the credit of the Pacific Coast amateurs? If Sgt. Tavers (6XW) can work his phone set a thousand miles on two tubes—if Mr. A. F. Pendleton (6UV) gets over two amperes radiation on four tubes and is heard in Washington—if

Sgt. Lufkin (SC) can be heard off Mazatlan, Lower California—what in the world is going to prevent the C.W. amateurs of the Pacific Coast from being heard in the East?

A NEW DEPARTMENT

The U. S. Radio Inspectors of the Sixth Radio District will conduct the new department "**With the Radio Inspector**", starting in the next issue of "**Pacific Radio News**."

This department will be a monthly feature, explaining to our readers the manner in which their stations should be operated in order to comply with the Radio Laws.

Co-operate with the Radio Inspector by sending us your questions on doubtful matters. The Inspector will answer them for you through this new department. Your requests should be marked: **Radio Inspector's Department, "Pacific Radio News."**

Sgt. Tavers and Lufkin, of the Presidio of San Francisco, are using a wavelength of more than 300 meters. If a few of the six thousand Eastern amateurs who read "Pacific Radio News" will do a little tuning in the neighborhood of 345 meters they may experience a pleasant surprise in the form of hearing a Sunday night concert by radio telephone from San Francisco.

Due to the heavy interference on 200

meters, the C.W. set has a small chance of "getting through" on the amateur wavelength. For this reason the San Francisco Radio Club has framed a proposal to be submitted to the Pacific Coast Advisory Radio Council, requesting that body of authority on radio to do everything possible in promoting C. W. communication.

Steps will be taken to authorize the use of wavelength in excess of 200 meters for tube work. As we go to press the first meeting of the Council is called to order. Representatives of the commercial companies and amateur organizations will discuss the advisability of discontinuing the use of the 300 meter wavelength for commercial work, in order to give the amateur a wider range of wavelength for C.W. transmission.

The commercial companies are not in favor of using the emergency 300 meter wave. They want it abolished. A vast amount of money will be saved if the use of the 300 meter wave is discontinued for commercial work. Short wave apparatus will no longer be necessary.

But the Pacific Coast Advisory Radio Council has not the power to abolish the 300 meter wave for commercial work.

It can suggest to the higher radio authorities that action be taken to discontinue the use of the "costly wave". Give the amateur a broader field for experimentation and the entire science of radio will be revolutionized and more fully exploited.

It takes the modern 1921 amateur to "do the trick"—and he is here to do it.

New York Office.....147 Sixth Ave.
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"Pacific Radio News" is a member of the National Association of Radio Dealers.

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SOMETHING DIFFERENT IN AMPLIFIERS

By B. F. McNamee, Chief Engineer, Moorhead Laboratories.

HOW can I get rid of that interference?"

This is the question asked by everyone who has tried to listen to the music sent out by the many radio telephones now working. Especially if you have tried to amplify the music in order to give your friends a "wireless concert," you have realized the need of some means of eliminating the "QRM." You have probably thought of using radio-frequency amplification. If you have not tried it, it was no doubt because you thought that the tube used for it would bring much louder signals if used for audio-frequency work.

The present circuit is designed to give the benefits of both kinds of amplification, without increasing the number of tubes. In fact, the same tube that is used for the radio-frequency amplification is used again as an audio-frequency amplifier. At the same time this circuit permits the use of a sensitive gaseous detector tube and a hand amplifier; in other words, each tube is functioning efficiently.

The step of radio-frequency amplification shown in this circuit will make the tuning much sharper, and thus eliminate many of the undesired signals, as well as the "mush" from local arcs.

Referring to the diagram, B, C and E are three honeycomb coils on the usual triple-coil mounting. F and G are two more honeycomb coils on a two-coil mounting. These two mountings should be placed some distance apart, to prevent interaction—a distance of two feet is sufficient. J is an audio-frequency transformer, whose primary and secondary are marked P and S, respectively. K is a fixed condenser of .001 m. f. capacity. I is a fixed grid condenser of about .0003 m. f. capacity. L is a hard tube designed for amplifying, while M is a soft tube designed as a detector.

The operation of this circuit is as follows:

The antenna circuit is tuned to the signal by means of the variable condenser A, and the secondary C is tuned by the variable condenser D. This is the usual loose coupler. The condenser K is used to permit the high-frequency induced in the secondary C to pass the transformer J, thus completing the high-frequency circuit from grid to filament. Since the tube L is a hard tube of the amplifier type, and since no blocking condenser is used in the grid lead, this tube will repeat the radio-frequency in its plate circuit, rather than act as a detector. The plate circuit of this tube is tuned to the radio-frequency by varying condenser H. There is sufficient capacity in the windings and cord of the telephones to allow the radio-frequency to pass through this plate circuit. F and G are the primary and secondary of a radio-frequency transformer, or as it is more commonly called, a loose coupler. Through the secondary G the high-frequency is finally impressed upon the grid of tube M. Since this tube is one designed for detector work, and since a blocking condenser I is used, an

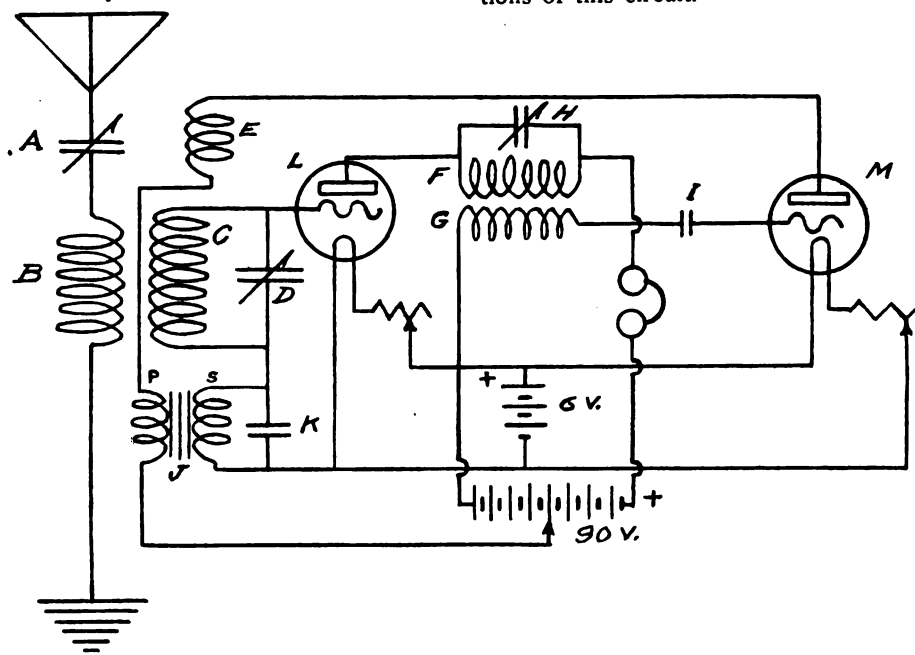
audio-frequency current will be obtained in the plate circuit of M. But even in this detector tube there will be some repetition of the high-frequency, and this is utilized by feeding it back into the grid of the first tube by means of the tickler E.

The audio-frequency current output of the detector, instead of flowing directly through the telephones, flows through the primary of the audio-frequency transformer J. The condenser K is too small to have any appreciable effect on the low-frequency output of the secondary of this transformer is really connected in the usual way, that is, between the filament and grid of the amplifier tube. The amplified audio-frequency then

ling between B and C quite loose. Begin tuning with the tickler as far from the secondary as possible, and after picking up the music, adjust the tickler for maximum strength. After adjusting the tickler, the signal may be still further improved by making a final adjustment of the secondary condenser.

This circuit may be used with good results on short waves. It will make the signals very sharp, and thus help working through the large amount of "QRM." For 200 meters, use the same condensers as above and the following honeycombs: B, 25; C, 35; E, 35; H, 25; G, 50.

Avoid the use of switches, as well as long wiring, in the radio-frequency portions of this circuit.



passes through the telephones.

Note that the plate battery applied to the detector tube is variable.

Thus with two tubes we obtain a step of radio-frequency amplification, radio-frequency regeneration, and a step of audio-frequency amplification. For further amplification remove the telephones and connect in their place the primary of an amplification transformer. The secondary of this transformer is connected to the next amplifier tube.

For receiving the music transmitted by the De Forest station at the California Theater, which sends on a wave length of 1400 meters, the following values should be used:

B, 200 turns (on the average amateur antenna); C, 250 turns; F, 150 turns; E, 200 turns (about); G, 300 turns; A, D and H, .001 m. f. each.

The setting of condenser A will vary with the antenna used. Condenser D is set at about 15 degrees, while H will be about half used. The coupling between F and G should be as close as the honeycombs will permit, and the coup-

FIRST "THREE OPERATOR SHIPS" ARRIVE IN PACIFIC

The first vessels of the commercial American merchant marine carrying three radio operators arrived in San Francisco harbor recently. The vessels are the "Golden State" and "Hawkeye State," built for the U. S. Shipping Board Emergency Fleet Corporation on the east coast. Both ships are equipped with a 5 k.w. Federal arc transmitter and a low power spark for short range work. The chief operator receives a salary of \$125 per month. Both assistant operators receive \$100 per month.

HAVANA, CUBA (PWA), IN OPERATION

Long distance radio service with Havana, Cuba, was recently established with the completion of the "PWA" station. The wave length used is 2,150 meters. No messages from ships will be accepted by "PWA" unless the ship is more than two days out of Havana.

THE DUPLEX RADIO TELEPHONE FOR THE AMATEUR

By H. Tenny

AFTER the first sense of novelty has somewhat abated from the consciousness of the elated new owner of one of those latest achievements of science, the Radio Telephone, he has borne upon him a rather depressing sense of operating unwieldiness caused by the bothersome necessity of throwing a switch, or a number of them, back and forth as he changes from talking to listening, and vice versa.

The experienced operator of the obsolete radio telegraph finds this switching a matter of relatively minor importance, as the transmission of language by Morse code is at best a sluggish and laborious procedure.

When we come to communicating the actual speech, however, the time and work element of this item is vastly increased, and early observance of this fact was made in government phones developed during the war, with the result that practically all new designs incorporate features which permit simultaneous talking and listening, called "Duplex" operation.

Such an arrangement was used in the semi-hi-power telephone used on the U. S. S. "George Washington" while carrying the President "Over There."

Among the earlier attempts at practical "Duplex" telephoning was that developed by Dr. Lee De Forest, who used a microphone transmitter having a small vane, which, operated by the tiny air currents caused in talking, controlled a system of electrically operated relays which effected the necessary switching.

This, however, did not entirely solve the problem, inasmuch as the receiving apparatus was entirely disconnected while talking, hence the talker could not hear while talking, nor could he talk while hearing.

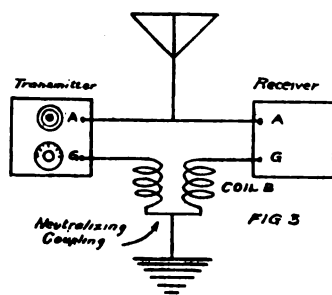
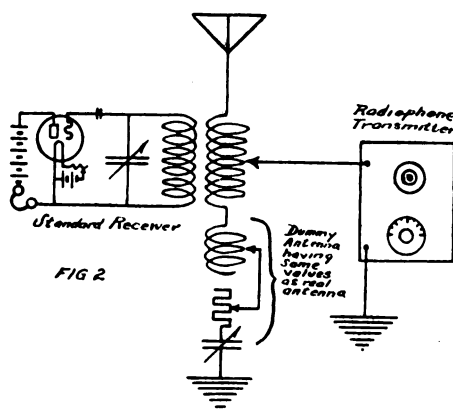
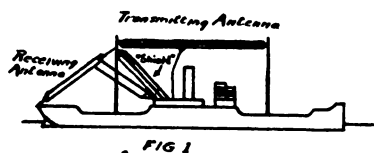
On the "George Washington" recourse was had to a separate receiving antenna, shielded from direct induction from the transmitting antenna. The success of this arrangement was due to the great difference in the wave lengths transmitted and received. With the transmitter radiating thirty-three amperes on wave lengths below two thousand meters, clear speech could be heard from the high power phone at New Brunswick, N. J., transmitting on four thousand meters, using very selective receiving circuits. (See Fig. 1.)

Such an arrangement, however, is, of course, impracticable for the amateur, who must therefore delve further into the possibilities of science for the filling of his needs. A circuit which accomplishes the object in a simple and effective manner is that shown in Fig. 2.

Use is made of a dummy aerial, which is placed in parallel with the actual aerial. The receiver secondary is coupled equally to both. The transmitting current divides equally between the real and the dummy aerial, and as they are both equally coupled to the receiver in opposite directions, they neutralize each other's effect on the receiver, and therefore the transmitted speech is not heard in the phones. In receiving, however,

the received waves effect only the real antenna and are carried over to the detector without interference from the dummy aerial.

The main drawback to this circuit is the fact that one-half of the transmitting energy is lost, being dissipated in the dummy aerial. For short-range work the advantages in convenience of opera-



tion far outbalance the loss of efficiency.

A new circuit which shows remarkable possibilities, but which is still in the experimental stage, is known as the "Speaker System," named after its inventor, and is illustrated in Fig. 3.

This system makes use of a "neutralizing coupling." As the antenna is alternately charged at high frequency, the receiver antenna lead is subject to surges of voltage. These are neutralized by counter-surges generated in the inductance B, which is connected to the ground terminal of the receiver. The surges being simultaneous and opposite in their effect on the receiver primary, no oscillations are generated in it and the transmitted speech therefore not heard in the phones.

The practical development of this circuit offers a wonderful and extensive field for the progressive experimenter. Standard duo-lateral inductances of various sizes can be used for the neutraliz-

ing coupling. As in the tickler couplings in regenerative audion circuits, care must be taken that the polarity of the B coil be such as to counteract the surges from the antenna connection, for if it is reversed it will have the effect of short-circuiting the transmitter. The correct polarity can be quickly determined by reversing the connections to the B coil and observing the effect. The coupling between the two coils should be varied until the transmitted speech heard in the phones is reduced to a minimum. In carefully designed apparatus it is quite possible that it may be eliminated entirely, even when radiating several amperes.

Experiments can be made to determine the correct amount of inductance for standard wave lengths to be used in each coil.

As a general rule, the best results will probably be had when both stations are using the same wave length. Careful tuning will be required to prevent heterodyne and beat notes from drowning out the speech.

PEKING EXPLAINS RADIO CONTRACT WITH FEDERAL CO.

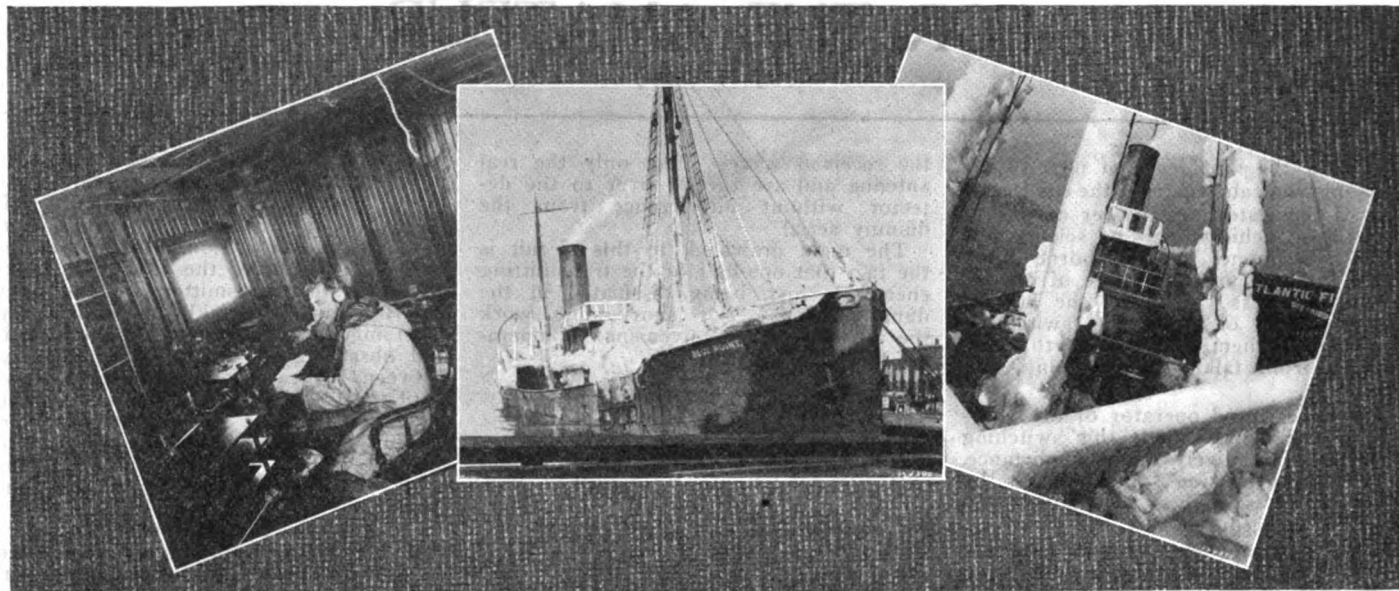
PEKING, February 11 (by the Associated Press).—In connection with the efforts of the British to effect a cancellation of the contract entered into between the Ministry of Communications and the American Federal Company for the construction of wireless apparatus, an official of the Prime Minister's office gave the following explanations of the situation:

"Plans were made by the aeronautic department of the government for forty add stations of 300 kilowatts each, but the Ministry of Communications disapproved the plan on the ground that their power would be too small for overseas use. For this reason the Department of Communications negotiated with the American firm for a station of more than 1,000 kilowatts and four stations of 600 kilowatts each, to be built in Peking, Harbin, Canton and Hankow.

"The purpose of the Aeronautics Department was to build many small stations inside the country, while the object of the Department of Communications was to erect a few stations powerful enough to reach foreign countries. The Aeronautic Department had an understanding with the Marconi Company and the contract of the Communications Department with the American firm does not entirely supersede it, because in future, when the Aeronautic Department wants to complete its plan it will still use the Marconi system.

"There also exists an agreement of the Ministry of the Navy with the Japanese for construction of a wireless apparatus, but the Japanese have not performed their part and since the Communications Department could not wait indefinitely while knowing the Japanese have not the material and therefore are not in a position to perform their part, the Communications Department concluded the American contract without hesitation."—San Francisco "Chronicle."

CURRENT RADIO



J. E. Bourke, Wireless Operator of the "Blue Point"

S. S. "Blue Point" at Dock After Her Battle with Seas, Wind and Ice

Ice on the "Blue Point's" Rigging

S. S. "BLUE POINT" WINS THROUGH

ON January 25th, the Siasconset wireless station of The International Radio Telegraph Company received the following message:

"New York Globe: At 3:36 P. M. our quadrant steering-gear went to smash, leaving us at the mercy of the worst gale of many years. Mate rushed to me to get SOS for help. Everybody in panic. Just as I was about to flash distress signal Captain Bishop banged into cabin shouting: 'Cut that damned thing off.' He was

already at work rigging up temporary gear with block and tackle, with which we hope to make Ambrose Light. From that point we can be towed to dock. This is the worst sea anybody has ever encountered. In 1912 I was in a big mess off Cape Hatteras, which up to that time was the worst within the memory of seamen. This has it beat. The poor devils now tending temporary steering gear are lashed to iron stanchions. Will keep you informed. Tell our wives not to worry."—J. E. Burke, Wireless Operator, S. S. Blue Point.

The "Blue Point" is a 324-ton steam

trawler operated in the interest of pure food by the New York "Globe," and is engaged in haddock fishing, off Nantucket. Though she was badly battered by the wind and seas, and laden with tons of ice, Captain Bishop succeeded in bringing her to New York under her own power. The accompanying photographs were taken after her arrival, and give some idea of her condition. The ice at one time covered her entire rigging and had to be chopped away from the antennae in order to enable her to use her wireless.

NEW RADIO STATION IN ORIENT

THE most powerful wireless station in the Orient is under construction by the Navy at Oshima, Sonoki-gun, Nagasaki prefecture, Kyushu, at an estimated cost of 6,000,000 yen, says the Japan Advertiser. Upon its completion the station will be able to communicate directly with all points of the world, say the Japanese papers.

The construction of the station was started following the decision of the authorities to build the eight-battleship and eight battle-cruiser squadron. What makes the station differ from others in the country is the manner in which it will be equipped. According to the Hochi, all equipment will be laid down in purely Japanese fashion. It is expected that when completed the station will be far superior to the Funabashi station in point of power.

It is believed that the station will be opened at the end of this year, subject to the sanction of the naval budget for the coming year. The abolition of the Yumihari naval wireless station will naturally follow the completion of the Oshima station, says the Hochi.

A wireless apparatus is also to be attached to the recently established Ocean Meteorological Observatory at Kobe, which has been largely handicapped by the lack of a radio station. The expense of the station is to be borne by public contribution, shipping companies and marine transport firms having already given 400,000 yen for this purpose.

PHONE TALKERS WARNED

Capt. Thomas W. Holmes, master of the five-masted schooner John W. Wells, now loading lumber in Port Blakeley for Australia, said recently that while he was 1,000 miles off the California coast he heard the chatter of the city of Los Angeles over its telephone wires by listening in with the ship's wireless.

"My attention was called to the wierd phenomenon by the wireless operator, who had tuned his apparatus down to 300 meters and had been doing some experimenting," said Captain Holmes. "I thought he was out of his head or had been drinking, but consented to put on the headgear and listen in. I could hear voices, evidently people talking over the telephone, and could make out distinctly what they were saying.

"I listened to a fellow in Los Angeles order a sack of potatoes from his grocer, heard the laughter of women who were gossiping with their neighbors and heard the election returns. I picked up the voice of a man who said that Harding was winning the election. He was talking to a business acquaintance and seemed to be very much elated over the way the contest was going. Wireless experts told me that hearing of voices by wireless apparatus aboard a ship is possible, but only under unusual conditions.

"All I have to say is that you had better be careful while talking over the telephone from a sound-proof booth and imparting a deep secret to a friend. Ships at sea may hear every word you say."—Seattle "Times."

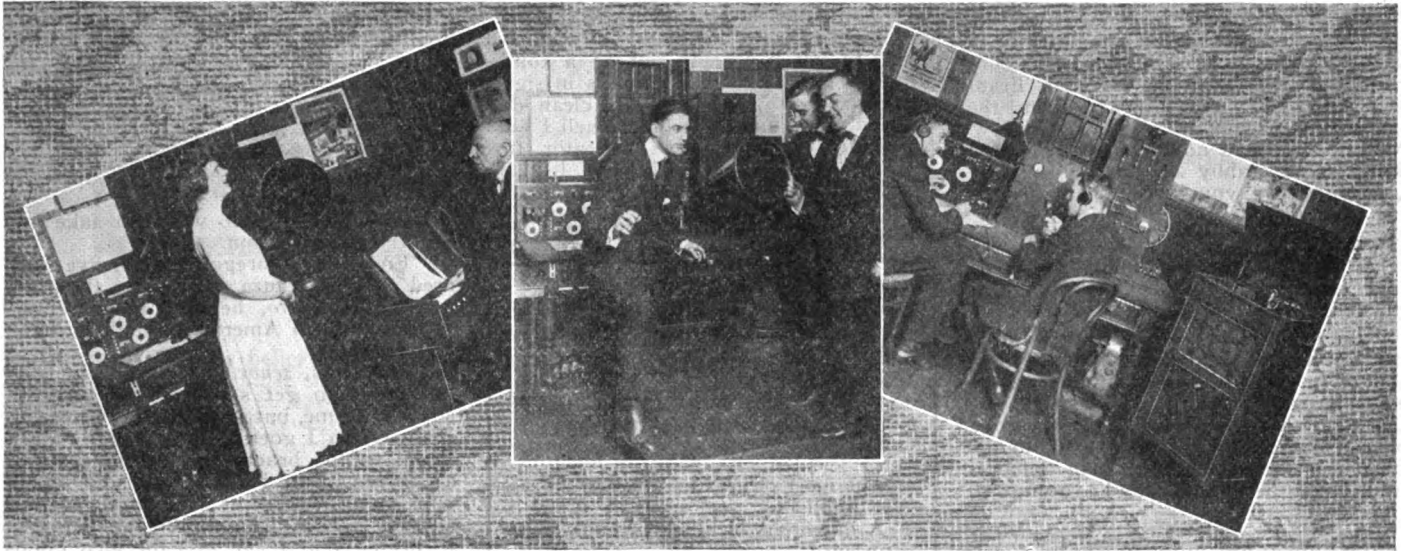
RADIO MUSIC FROM THE PRESIDIO OF SAN FRANCISCO WAKES UP RESIDENTS OF LOS ALTOS.

GREAT excitement prevailed on a recent Sunday evening among residents living within several miles of Emile Portal's receiving station at Los Altos, about thirty-five miles south of San Francisco. Portal was enjoying the radio telephone music sent out by the Presidio of San Francisco (6XW), when he conceived the generous idea of letting his neighbors enjoy it, too. Suiting the action to the inspiration he hooked up six-stages of amplification between his short-wave receiver and his Magnavox and opened the windows. His home is in a country district where the neighbors are well scattered, but it was only a few minutes before they began telephoning to ask Portal if that music they were hearing was coming from his house. Whenever any unusual sounds occur around Los Altos, the natives always know where to look to find their source. As the concert progressed more distant neighbors telephoned that they were enjoying the music from their porches and hoped that it would continue.

Astonished by the distances from which some of the reports were coming, Portal drove a mile down the road to hear the results for himself and found that every word of Sergeant Tavers' announcements were easily understood.

Residents of Los Altos haven't entirely recovered their equilibrium yet, but are now asking for regular Sunday evening concerts to be enjoyed from their front porches.

NEWS ILLUSTRATED



Left: Wireless telephone carries music fifty miles. Practic ability of new Westinghouse instrument for conveying music to large number of places demonstrated in test.

Miss Frida Stjorna, Swedish soprano, singing into the new Westinghouse wireless telephone in the tower of the 71st Regiment Armory in New York City, with Frank L. Scaly, organist of the New York Symphony Orchestra playing the accompaniment on a portable organ.

Miss Stjorna's voice and the organian music of Mr. Scaly were heard fifty miles from New York by passengers on the Fall River Line steamer "Plymouth."

Instrumental music was played in the tower for a dance in the McAlpin Hotel, and in addition to the successful transmission to the steamer and the hotel, amateur operators in the region around New York.

The instrument can be used for distributing music over a wide area, for the benefit of any number of audiences. It has been suggested that the Westinghouse wireless phone could be used in a big hotel or a vast amusement place to enable one orchestra to furnish music for a large number of ballrooms.

The transmitter is a very small apparatus, and can be carried around very easily.

This occurrence was photographed by Galloway, New York, only. Copyrighted by photographer.

Center: Vaudeville comedians singing and cracking jokes into the new Westinghouse wireless telephone, in the tower of the 71st Regiment Armory, New York City. They were heard fifty miles away by passengers on a Fall River Line steamer on Long Island Sound.

Center: Wireless telephone operators transmitting talking machine music with the new Westinghouse wireless telephone in the tower of the 71st Regiment Armory in New York City to the steamer "Plymouth" of the Fall River Line, fifty miles from New York City, and to dancers in the McAlpin Hotel, New York City. The music was transmitted with wonderful clarity.

Portal distinguished himself during the recent automobile show in San Francisco by a similar performance when music from the Presidio was projected for a distance of several blocks from an automobile while it was being driven about the streets of the city. The automobile started from Twin Peaks where a small antenna was stretched about ten feet above the ground between bamboo poles at the front and back of the car, and the Presidio radio phone was tuned in. The machine was then driven down town and down Market street followed by the wide-mouthed gaze of the astonished pedestrians. Driving up to the front of the Civic Auditorium where the automobile show was in progress, Portal in the car with Sergeant Tavers at the Presidio rendered a choice concert for the benefit of the large crowd that gathered.

The apparatus in both cases consisted of a standard Colin B. Kennedy short-wave receiver and audion control panel, two Kennedy two-stage audio-frequency amplifiers and a Radio Magnavox with two stages of amplification, making a total of six stages. This unusual amplification was effected with an entire absence of squeals, howls or other foreign noises. The automobile was a La Fayette furnished for the tests and driven by E. W. Milburn, general manager of the Greer-Robbins Company.

RADIO PHONES FOR BAR PILOTS

What next?

The pilots station on the bar outside the Golden Gate are to have their sloops equipped with wireless telephones.

Announcement to this effect was made by pilot port admiral, John Wallace.

No longer will steamships dally in the fog in search of the pilot before entering the harbor. A simple call on their wireless apparatus will bring Mr. Pilot to the phone and they will be told where to lower away their skiff.

Thus the last vestige of adventure which has marked the operations of the bar pilots will be swept away and the finishing touch of luxury and comfort added to the men who navigate liners in and out of San Francisco harbor.

"What ho, my hearties, is there a drink on the bar?" is one of the phone conversations suggested by shoreside skipper upon hearing the news.

Communication with the pilot boats will be maintained with a similar wireless phone set established at the local pilot office.—San Francisco "Examiner."

FEDERAL TELEGRAPH'S YEAR

Stockholders of the Federal Telegraph Company recently held their annual meetings in the Mills Building. In the absence of President R. P. Schwerin, who is in New York on business regarding the contracts for the construction of six 1,000-foot wireless towers in China,

his brief report covering activities of the company during the year was ordered read by Vice-President Leon Bocqueraz.

It referred to the dissolution of the Poulsen Wireless Corporation, told of the necessity of installing wireless stations for coast service as the result of action by the Pacific Telephone and Telegraph Company, of the success of the Lafayette station in France, and reported progress toward the first steps in the construction of superstructures in China.

An interesting part of the report was the preliminary financial statement which will be mailed to stockholders when audited. It shows that on December 31, 1920, the company's total assets were \$3,571,894. Of this amount \$359,120 was recorded as plant property, \$122,703 as construction assets, while \$2,532,673 was set down as rights and contracts. Current assets are reported at \$463,248, while cash on hand totals \$85,200. Accounts receivable are listed at \$125,366, materials and supplies at \$108,557, work in process \$144,123, and miscellaneous investments at \$1,941. Government claims are reported at \$61,772, while defined debit claims are set down as \$30,435. On the liabilities side of the sheets, capital and surplus are reported at \$3,198,001, current liabilities \$167,237, and reserves at \$206,655.

The outgoing directors were re-elected.—San Francisco "Examiner."

TOUGHER THAN A GOAT

By Volney G. Mathison

Another Samuel Jones story by the Author of "The Fall of Samuel Jones"

OU'RE looking pretty glum today," remarked Cunningham to Samuel Jones, who sat morosely contemplating the broad view of San Francisco Bay that was afforded from the audion-tube man's office window. "What's happened now? Have you been giving some crabby skipper a black eye again; or have you merely had another row with one of your affinities?"

Removing his gaze from a big freighter that was steaming out past Goat Island, the old shellback operator frowned sourly upon Cunningham.

"Humph, that's old stuff. Why don't you spring somethin' new once in a while?" he retorted, sourly. "An' what's furthermore, I reckon if you'd get an idea all of a sudden that you was goin' to be a millionaire, an' then lost out an' come near kickin' the bucket in the bargain, you'd be lookin' kind'a glummish yourself."

"Let's hear about it," prompted Cunningham. "Get the yarn off your chest, and maybe you'll feel better."

"Well, I s'pose you will, if I don't. You always like to get hold of my doin's an' peddle 'em around to every darn fool in town, don't you?"

"Oh, come on, now, you know that isn't so," protested Cunningham. "Why, if I told everything I knew about you, you wouldn't be here, Samuel—you'd be in jail."

"Yes, an' that's where I'll finally git anyways, if prohibition hangs out much longer," gloomed Samuel Jones. "But look here, if I tell you about this, you got to keep it mum. I sure don't want the supervisor to hear about it."

"You can be sure he'll never hear about it from me," Cunningham assured him; "so spiel away."

"Well, it was sure one rip-snortin' adventure, an' I ain't forgettin' it right away either, lemme tell you." The old shellback tipped his chair back and hoisted one long, lanky leg up over the other.

"You know, about four weeks ago, the supervisor sticks me on the big oil-tanker 'Selville,' for a trip to Panama. The 'Selville's' got an arc set, an' she was workin' fine, but just when we was half way back home what happens but the only can of alcohol I got goes an' upsets, leavin' me nothin' to run my arc with. There was some kerosene around the ship, but you know you might's well chuck an arc overboard as to put that soot-makin' stuff into it. I didn't run the set for a couple of days, but at last the steward digs up a quart bottle of grain alcohol out of the ship's medicine chest, an' gives it to me; so that night I fires up the ol' juice-squirter an' tries to raise San Pedro."

"We was way down the Mexican coast, an' it was a pretty long stretch to work through all the static. The old man was in a big sweat about a message or I wouldn't have tried it; because it was sure painful to see that darn arc guzzlin' all that good drinkable alcohol. Seemed like it took about five times as much to keep the arc burnin' steady as when usin' the denatured dope, but I couldn't see no help for that, an' I keeps hammerin' away. 'Long about two in the mornin' I was still settin'

there poundin' brass, tryin' to raise a chirp out'a NPX, though it was like tryin' to get a warble out of a tombstone. The end of the alco was in sight, an' I was wet with sweat an' clean disgusted, an' wonderin' what in hell I ever learned to be a wireless operator for, anyway, when all of a sudden, I hears some damped spark scratchin' out my call. Cuttin' out my tickler an' tunin' in the signals, I hears XAE, the Mexican

other word, he gets into the Mexican's boat an' goes ashore.

"We was all up in the air about the mystery, an' we was all standin' around arguin' whether the Japs had declared war, or if the old man had gone batty, when a native comes out from the beach in a little dugout, an' asks if anybody wants to go ashore."

"How much you want to take me ashore?" I asked him.

"Five pesos Obregon dinero, five hundred pesos Carranza dinero, five thousand pesos Villa dinero," he says, in bum English. "How much American dough is that?" I demands.

"Two bits, *senor*," he says, politely.

"I tries to get some of the gang to come with me, but they wouldn't take no chances; so I goes ashore alone. When I got to the beach, I remembers all of a sudden that I left the radio shack open, with what was left on that grain alcohol standin' on the table, an' I thinks to myself that I can kiss the alco goodbye if that bunch of booze-hounds on the ship ever sees it there."

"Where's this Del Cabo, or whatever you call it?" I asks the Mexican; for there ain't nothin' on the beach but palm trees an' cactus. The *hombre* points out a road that runs back from the beach, an' I starts off. The road straggles along through the palm trees an' a lot of other tropical truck for a couple of miles, an' then I comes to a old tumblin'-down shed, with a big high fence around it. When I gets up pretty close, what does I see lyin' inside the fence but an ugly monstrous snake. Say, I've seen them pythons in the zoos, but they'd all look like a bunch of little garter snakes alongside of this giant boa-constrictor, an' that's no joke. As sure as I'm sittin' here, the thing was over fifty feet long, if it was an inch, an' it was about three feet through in its thickest places. It was kind of a dull gray and black color, an' it had a wide, flat head an' a pair of jaws big enough to swallow a cow, easy. It was movin' an' squirmin' around kind of slow an' heavy, like a snake does, an' it sure give me the shivers to watch it. Pretty soon it crawls into an old shed in the middle of the yard; an' then I goes on.

"Just a little way farther, the road widens out into a kind of a street an' wanders around like a cow-trail between a couple of rows of flimsy huts, built out of *mesquite* trunks an' palm leaves. Finally, I reaches the middle of the town, where there is about a dozen one-story houses, all built low an' square an' lookin' like a string of shoe-boxes. All the doors an' windows had gates an' shutters made out of heavy iron rods, an' there wasn't no sign of life no place."

"I hears the poppin' of a gasoline engine, though; an' I notices that the sound is comin' from a big shack standin' pretty well off to one side, which has a wooden lattice mast on each side of it. I makes this out for a wireless station right away; an' I starts toward it. The lattice masts was about a hundred feet high, an' they was carryin' a fan aerial, made with one big cable stretched between the two masts, an' about thirty vertical wires strung off the cable, with their lower ends all runnin' into the station."

(Continued on page 302)

In the May Issue

"ARCHIBALD AUGUSTAS GETS A SCARE."

By V. G. MATHISON

The most clever radio fiction story yet published.

A humorous blending of truth and nonsense.

It will take you back to the "Good old days" of Radio.

DON'T MISS IT!

station at Mazatlan, callin' me like he was clean frantic. When he quits, I jumps in an' tells him to go ahead; an' right away he comes back an' rattles off a three hundred and twelve word message—all in Spanish. I don't savvy that spig lingo, but I manages to copy the message pretty straight, an' I OK's for it."

"Deliver to the captain of the 'Selville' immediately," he comes back, in English this time, an' that's the last I hears of him.

"Wonderin' and puzzlin' what it was all about, I wakes up the old man an' gives him the message. Well, say, when he reads it, he just jumps outa bed in his pajamas an' raves like a wild man."

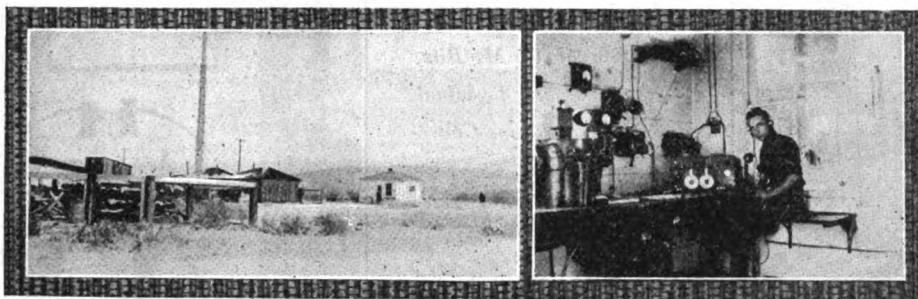
"Why didn't you give me this before?" he howls; then he rushes out an' rouses out the mate. 'Have the officer on watch blow the whistle every thirty seconds,' he bawls. 'Get a couple of sailors' an' put 'em to ringin' the ship's bell for all they're worth; an' then go an' get out the chief an' tell him to open up the engines an' shake out some speed even if he busts every boiler in the damn ship!'

"Believe me, there's no more sleep for nobody after that. What, with the whistle blowin' an' the ship's bell a bangin' an' the old coffee mill wide open, links down an' passovers on, makin' the old boat shake an' shimmy worse'n a jane at a jazz dance, there was racket enough to give a wooden Indian a ear-ache. Everybody piles out, wonderin' what in blazes is the matter, but the old man wouldn't say nothin', only to keep yellin' for more speed. Early in the mornin' we makes Cape San Lucas, which is the very south end of Lower California; an' then the old man runs the ship up to San Jose Del Cabo, which is a Mexican burg about twenty miles farther north. We comes dashin' into the bay like a house afire, drops anchor, an' 'right away a little boat, rowed by some Mexicans in uniforms, comes out to us from the beach."

"Be ready to sail at six tonight," barks the old man; an' then, without an-

NEW STATIONS OF THE AERIAL MAIL SERVICE

By H. L. Rodman



East Tower and Station Building at
Elko, Nevada

Operating Station at
Elko, Nevada

*An Overland
System of Radio
Using the Standard
Federal 2 K.W. Arc
Transmitter and the
Navy Type S. E. 1420
Vacuum Tube Receiver*

WHAT is believed to be one of the most efficient radio circuits in the world, in terms of power-input and distance covered, is in daily operation between two of the United States Aerial Mail Service radio stations, one at North Platte, Nebraska, the other at Elko, Nevada.

The distance between these two stations is approximately one thousand miles, over one of the most broken portions of the United States.

Four schedules a day are worked constantly, two in the forenoon and two in the afternoon, and the traffic handled is copied direct on typewriters.

Although there are three other stations between these points at intervals averaging 250 miles, North Platte and Elko work direct for the purpose of clearing through traffic and saving the time that would otherwise be required to relay from point to point.

The most remarkable part of this circuit is that the stations are equipped with arcs of only 2 K. W. nominal power.

The receiving apparatus consists essentially of navy standard 1420 receivers and two-step amplifiers, utilizing both Moorhead and Western Electric tubes.

The amplifiers were added simply to facilitate the use of the typewriting in copying, as there is quite a good basic signal.

These two stations are links in a chain of six arc stations stretching across the western part of the United States which were recently built by the Air Mail Service, coming under the jurisdiction of the Second Assistant Postmaster General at Washington, D. C.

North Platte is the easternmost arc station and communicates with an Air Mail spark station at Omaha, Nebraska, constantly, and with the U. S. Naval Radio Station at Chicago at frequent intervals.

North Platte is the easternmost arc station and communicates with an Air Mail spark station at Omaha, Nebraska, constantly, and with the U. S. Naval Radio Station at Chicago at frequent intervals.

Proceeding westward we find a 2 K. W. arc radio station at or near each landing field, as follows: Cheyenne, Wyoming; Rock Springs, Wyoming; Salt Lake City, Utah; Elko, Nevada; Reno, Nevada.

Reno is the westernmost station and has regular schedules with the San Francisco Navy Radio.

It was stated that the stations are "at or near" the landing fields. At Cheyenne which was the first of the arc stations

to be installed, the towers were placed on the field. This was found to be an error, as radio towers on airplane landing fields have proved to be more of an obstruction to aerial navigation than a guide. Several instances are on record where pilots have crashed into radio towers on landing fields.

For this reason the radio towers are now placed at from one to five miles from the landing fields, communication with the field being made by telephone.

The station at Elko, Nevada, cuts of which are shown herewith, is typical of the Air Mail construction, although the other stations do vary somewhat as to details.

The two towers are 110 feet in height, built up to 100 feet on a modified Howe Truss plan, with 10 foot topmasts above the trusswork, the base centers being separated by 300 feet.

At the base the towers are four feet square; at the top about two and one half feet, giving the towers a slight taper which is very pleasing in appearance.

To guard against high winds, four sets of guys are employed.

The antenna at Elko is of the "T" type. Five wires, each 280 feet in length, spaced 3 feet 6 inches apart on 15 foot spreaders comprises the flat-top portion, and five wires, cabled together about ten feet from the top, are used for the down-lead.

The down-lead is anchored by a string of eight goose-egg insulators, to relieve the entrance insulator of any excessive wind strain.

The large grounding switches for protecting the installation against lightning is located on the outside of the building, near the entrance insulator, and a heavy lead is taken to ground from this switch so as to provide the best possible protection to the set during a severe electrical storm.

The arc was modified slightly at Elko, as was done at the other air mail arc stations, so as to obtain certain desired results.

These two kilowatt arcs are designed to operate on 600 meters as well as on 2,400 meters. A very strong magnetic field is necessary for the arc to function on 600 meters due to the high corresponding frequency of 500,000 cycles. On a wave-length of 3000 meters, with its corresponding frequency of 100,000 cycles, the same strength of magnetic field is neither necessary nor desirable. The action of the arc is naturally slower at this lower frequency and the same strength of field employed at 500,000 cycles (600 meters) for maximum radiation is much too strong for obtaining

maximum radiation at 100,000 cycles (3000 meters) due mainly to the fact that the arc is blown out too soon during each cycle, not allowing the full amount of current to flow during the discharge portion of the cycle.

As the wave-lengths selected for these stations range from 2800 meters to 3600 meters, and no work was contemplated on shorter wave-lengths, it was at once apparent that a weaker field than that created by the four field coils in series was desirable.

Leads from each field coil were therefore brought out and the series-multiple scheme of connections utilized. This served to weaken the field strength, to allow a greater current to be used through the arc, and at the same time reduce the heating of the field coils when using this greater current.

With the series-multiple scheme of connections, a current of 15 amperes is used in the arc at 200 volts, making the actual power input 3 kilowatts.

It will be noted that although a heavy current is being used for so small an arc, the power consumed in kilowatts is not proportionately great, due to the low voltage used, this latter being made possible by the low antenna and ground resistance at the wave lengths employed.

The method of signalling used at Elko and other air mail arc stations is the coupled compensating method, using two turns of radio-frequency cable loosely coupled to the antenna loading inductor. The signalling or lower wave is separated from the upper or compensating wave by approximately 50 meters.

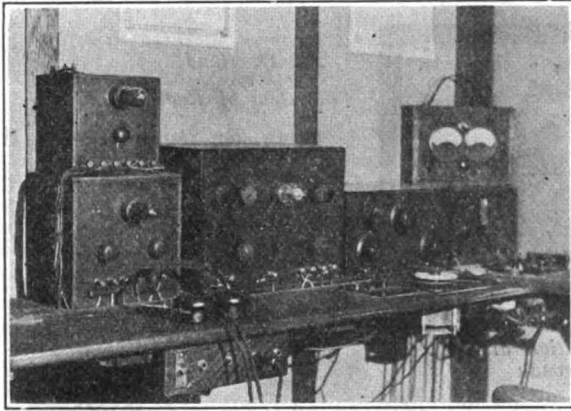
Although these particular arc sets are equipped with the ignition key signalling apparatus, the coupled compensating method was found best adapted to these stations, and in addition to being best adapted, it is preferred by the operators.

A surprisingly large amount of traffic is being handled by the air mail stations, their principal use being the reporting of arrivals and departures of mail planes and handling the telegraph business of the air mail service between Washington, D. C., and the officials in the field.

The circuit is complete between San Francisco and Washington, connection being made east of Chicago through other air mail radio stations employing spark systems.

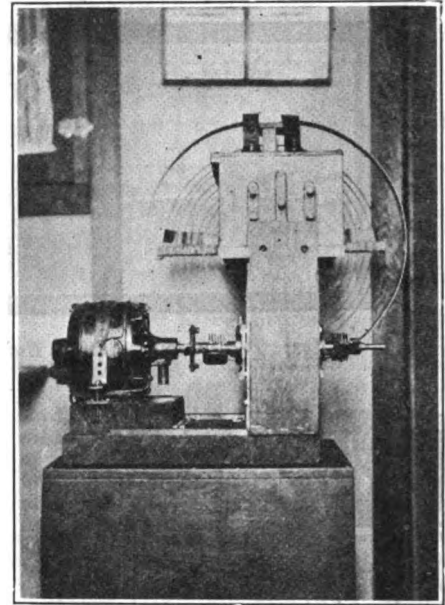
There is, however, no communication with the mail planes, as the planes are not as yet equipped with radio. This will doubtless come with the growth of the air mail service in the near future, as will the direction finding apparatus and other radio aids to aerial navigation.

6 JD - LOS ANGELES, CALIFORNIA



This is another of the best Pacific Coast Amateur Stations. You can always tell a record-making station by the absence of needless apparatus. 6JD has a receiving set of the regenerative type and a two-step amplifier. Let's have a few more photos of this type, Fellows.

*Record making and
Record breaking
Station of V. M. Bitz,
Pacific Coast Terminal
Station of Trans-Con-
tinental
Relay.
Message
to Hartford,
Connecticut and
Return in
6½ Minutes.
Signals from
this Station .
Have Been
Heard at a
Distance of more
than 2,500
Miles.*



*One turn in the closed circuits is used by
6JD. Note the compactness.*

BAY COUNTIES CLUB HOLDS SOCIAL

ON Friday evening, February 25th, the members and friends of the Bay Counties Radio Club were given many thrills in the form of a grand social meeting. The affair was held in Klinker Hall, 59th and San Pablo Ave., Oakland, with an attendance of over 185 radio men from the Bay Cities and San Francisco.

Among the many unusual surprises of the evening was the "Liar's Contest." The person telling the "biggest lie" was to be awarded a grand prize. Mr. Harold Irthum, one of the club members, was the winner of the contest. He dealt with length on his cruise with Christopher Columbus at the time that America was discovered. Mr. Irthum, radio operator of the exploring vessel, took the entire credit of discovering the continent as a result of the information he received via radio. Mr. R. W. Carroll, Secretary of the club, delivered an address entitled "Why you should be a member of the Bay Counties Radio Club." Mrs. R. W. Carroll, dramatic reader, furnished one half hour of amusement with her humorous selections.

Light refreshments and lunch were served. (The response was hearty.) Cake, beans, sandwiches and coffee were plentiful. The California Theatre in San Francisco furnished the radio musical program of the evening. A raffle was also held. Apparatus was donated by the Leo J. Meyberg Company, Colin B. Kennedy Company, California Electric Supply Company, Pacific Radio Supplies Company and The Radio Telephone Shop.

TECH HIGH RADIO CLUB

AT the 34th meeting of the Tech Radio Club, on February 3, 1921, Mr. Metcalf of the Magnavox Company, gave a very interesting talk about the Magnavox loud speaker. He also gave the history of the Magnavox, as well as explaining the principle involved in this electro-dynamic receiver. As the Tech Science Club attended this meeting, much interest was stimulated along the lines of radio.

The next day an assembly of the student body was held. At this assembly a radiophone concert was given. This was only made possible through the courtesy of the Magnavox Company and Sergeant Travers of the Signal Corps, located at the Presidio, San Francisco, with whom plans for a lecture and music reception were made.

A small two-wire aerial not over 75 feet long and 40 feet high was used, and another stretch of bell wire wrapped around a water pipe serving for a ground. Together with this a three step power amplifier using 400 volt B-battery was employed after stepping up with a two-step amplifier. Most signals could be heard all through the halls and in front of the school very distinctly.

After president Wallace Brainard of the club had made a short talk on the subject of telephony, the bulbs were turned on. The radiophone speech of Sgt. Travers was about fifty times as strong as an average man's voice, being in fact too loud, because of the echoing. After Sergeant Travers had completed his lecture, he played a few records on the phonograph, after which the concert was terminated. Another interesting

SAN FRANCISCO RADIO CLUB NOMINATES OFFICERS

AN election of officers of the San Francisco Radio Club, Inc., will be held in the club rooms, 2460 Sutter street, Thursday evening, April 7th, at 9 P. M.

The following have been nominated: For President, Sgt. W. E. Lufkin, Prof. C. R. Tinsley, V. C. Litton; For Vice-President, I. H. Baum, S. N. Petersen; For Secretary, Geo. F. Barry; For Treasurer, Sgt. R. Tavers. H. Shomaker.

Elections will hereafter be held semi-annually, as the result of a resolution passed at the regular monthly business meeting in March.

Ten new members were admitted to the club during the past month. A committee of six was appointed to interview the U. S. Radio Inspector in an endeavor to permanently close the stations of several local amateurs who have been the cause of much unnecessary interference.

feature of the assembly was an experiment with an Ingersoll watch which was held up to a microphone. The ticking of the watch could be heard very distinctly all through the auditorium, much to the amusement of the student body.

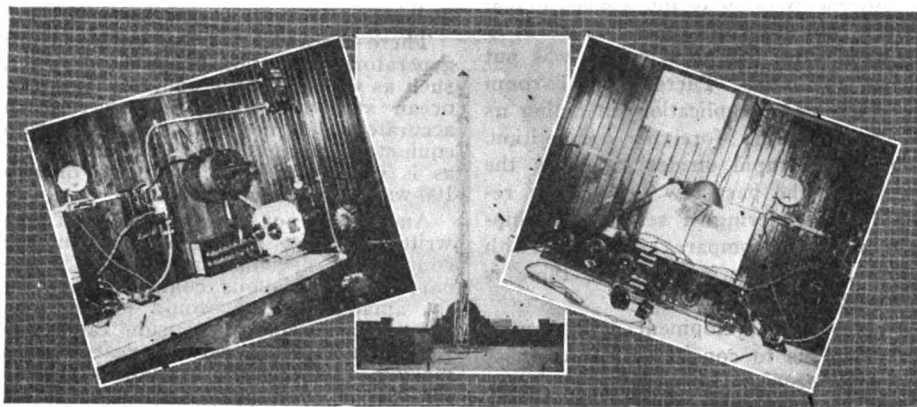
During the week eight members were enrolled in the Radio Club, probably on account of the stimulated interest. We now have our meetings every Thursday afternoon at 3:15 P. M.

SAN JOAQUIN LIGHT & POWER COMPANY INSTALLS MODERN STATION AT FRESNO, CALIF.

MR. R. C. DENNY, Operating Engineer of the San Joaquin Light and Power Company of Fresno, Cal., supervised the installation of the efficient station shown in the accompanying photographs for the use of transacting business of the Power Company.

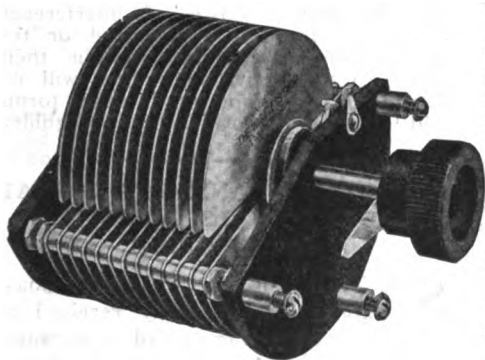
The station is one of several erected by the Company to maintain reliable communication between its various power plants. The Fresno station employs a regenerative receiver and two-step amplifier of sufficient power to establish uninterrupted communication with the other stations of the circuit.

Two towers, forty feet high, support the aerial of the Fresno station.



"WIRELESS SHOP" VARIABLE CONDENSERS

THE Wireless Shop of Los Angeles, has just placed on the market a new variable condenser, which will be known as their Series "CW". This condenser has been designed to meet the increasing demand for a high-grade condenser, especially designed for CW telephone and telegraph sets, and should help out many an amateur who has been experiencing trouble from his condensers. The plates are of heavy gauge, hard rolled sheet aluminum, which are punched in the best sub-press dies obtainable.



These plates are widely spaced in the condenser in order to withstand the high potentials used on the plate of the modern CW set. The insulation throughout the condenser is genuine Formica, being machined from the sheet instead of moulded, making a much better job, mechanically and electrically. Dielectric losses in "Wireless Shop" condensers are very low, due to the use of solid Formica end plates.

A very essential feature of all "Wireless Shop" variable condensers is the copper ribbon connection to the moving system of plates, which entirely eliminates the possibility of dirty contacts in the condenser. A stop pin, bearing on the edge of all movable plates in the smaller types, and on the end collars on the larger types, limits the rotation of the moving system to 180 degrees, there-

by reducing the liability of breaking the copper ribbon.

Mr. Edgcomb, manager of "The Wireless Shop" writes that although the company's manufacturing facilities have been worked to the limit in order to supply the trade with variable condensers, they are constantly adding to their equipment, and will announce several new instruments to the amateur field in the very near future. At the present time the company is manufacturing, besides variable condensers, a very large and complete line of high grade parts, for the amateur who would rather build his own apparatus.

A new bulletin has just come from the press, illustrating and describing the entire line of "Wireless Shop" variable condensers, which Mr. Edgcomb states will be mailed upon request to any one interested.

MONTEREY RADIO ASSOCIATION HOLDS IMPORTANT MEETING

THE regular meeting of the Monterey Radio Association was held in the club rooms of the Presbyterian church on February 7, 1921.

Lieutenant Calvin H. Burkhead, radio officer of the local Presidio, spoke to the members on the uses of wireless in directing the air forces in the world war. He told in detail just the system used for directing air squadrons over the front line trenches.

His talk was enjoyed by all those present and he was given a vote of thanks for his trouble.

The association has purchased a complete receiving set, which will be installed in the club rooms. This set has been built by members of the club and the parts paid for entirely by the members.

The club, up to the present time, has been entirely self-supporting and in the past year the membership has grown to a total of twenty-three.

This is a live organization and deserves the support of the people of the Peninsula.—Monterey "Cypress."

STOCKTON RADIO STATIONS GOING STRONG

Stockton's radio relay night, held February 28, by radio operators of the city to demonstrate the efficiency of experimental and amateur wireless stations in coast-to-coast radio transmission, demonstrated several things very conclusively. For one it was shown that people when offered the chance of securing something for nothing are glad to avail themselves of the opportunity, as evidenced by the fact that up to six o'clock a total of forty-seven wireless messages, directed to points over the United States, were filed with the local stations. It demonstrated another fact with equal clearness—that amateur radio stations form an important means of emergency communication and established the possibility that the Pacific Coast record for the greatest number of messages transmitted in continuous order to a station over a distance of 1,000 miles without relay had been broken.

Of the forty-seven messages filed up to closing time of the radio men's offer, forty went through toward their destination without hitch. That the other seven did not go on their way was due to the fact that the fortieth message was sent just as day broke, at which time Paul Oard sent the final check with station 7IZ after a continuous transmission with only a half hour break, starting at 10 o'clock the evening before. As day broke, signals "faded," necessitating the holding over of the remainder.

GONZAGA IS LINK IN INTER-SCHOOL WIRELESS LEAGUE

Gonzaga will be linked by radio with the other schools of the Pacific Coast in a regular wireless communication system, according to Mr. Francis Prange, S. J., professor of science, who has announced that the Gonzaga radio plant, one of the biggest amateur outfits on the Pacific Coast, will be in operation within two months.

The establishing of a regular commercial-like system between Gonzaga and

(Continued on page 300)

SHIPPING, SCIENCE AND COMMON SENSE

By Arthur H. Lynch

REALIZATION of the many aids afforded by radio to our marine industry has not been accomplished even by the wonderful uses to which it was put during the war. There is still room for much wider application, in aiding us to cope with foreign competition. Though the rapid strides taken by the art within the past few years have resulted in rendering a service to ship-owners which compares favorably with the present land wire systems, there is still room for improvement.

And in this development, it is incumbent upon us to consider the usefulness of the amateur and experimenter. Many of the most valuable discoveries in the radio enterprise are the direct result of amateur research.

The audion, a seemingly insignificant device, which has revolutionized the systems for transmitting and receiving, was discovered by Dr. Lee De Forest, and, though he is an accomplished experimenter, he makes no pretense of being a professional, in the sense which some seek to give the word.

A device which was designed for use in the trenches and enabled men in a dug-out, many feet below the surface of the earth, to communicate with stations several miles distant, was the development of an "amateur."

And the remarkable performance of a New Jersey experimenter of sending broadcast radiophone music and speech which was heard by another amateur in Scotland, would cause us to believe that some of the professionals are in no position to look down upon him. But there is agitation among some of the legislators concerning the amateur, and they desire not merely to curtail his efforts, but to abolish him entirely. Before considering this legislative policy, let us see more clearly what this amateur has actually done.

Under the existing laws, in this country, the activities of the men and youths who desire to experiment with radio must be kept within certain well-defined electrical limits. Working within the lawful scope puts the experimenter at a distinct disadvantage when the use of power suitable for covering great distances would be desirable. But he has taken the action good naturedly, realizing that commercial and government communication must not be interfered with. In addition to this, he has developed apparatus of such extreme technical co-ordination and efficiency that his correspondence is carried on with considerably less power and much greater skill than that necessary for the management of the usual types of commercial equipment.

There are certain electrical characteristics which render the use of great power ineffective, if the law is followed. Under ordinary conditions, all the law allows him to use is one kilowatt or about one and one-third horsepower. That is just one-half the amount of the rated power of many marine installations. With even this power, we find but few instances of vessels communicating directly across the Atlantic. When we consider the accomplishment of this wireless telephone feat, only one-fifth the lawful power was used, or one-tenth

that of the general commercial ship transmitter, its significance is more striking.

There were no 600-foot towers, nor generators of hundreds of horsepower, such as we find in the commercial transocean stations. There was merely an accurately designed and controlled radio equipment, using about as much power as is necessary for the lighting of two 100-watt incandescent bulbs.

And it is not the intention of the writer to cast any aspersion on the commercial development, nor to insinuate that continuous communication by the amateur station would be possible. Commercial radio has made rapid advances during the past few years and is making itself felt as a dynamic force for the promotion of international as well as domestic communication. Rather would he depict the deplorable ingratitude we would show by casting from our midst a body of earnest workers, who burn the midnight oil in an effort to perfect one of the arts which already is recognized as a potent factor in our commerce.

When the war broke over our heads we were unquestionably in a state of unpreparedness. One branch of our military and naval organizations which did not need the same amount of drilling as some of the others was the signal system. Many amateurs were immediately capable of filling important posts, while others were far enough advanced to make it possible for them to be put on productive work in a much shorter time than would otherwise have been possible. Many of them were capable of undertaking the teaching of others. And the signal system of our military machine was a section which we have every reason to be proud of. Many of those who were not either directly in the army or navy were designing apparatus, or making it, for one of the companies which were called upon to furnish it.

Much Disregard for Laws

The fault is not entirely with the law-makers, but is the result of unlawful activities on the part of some members of the amateur ranks. In some cases there has been, and undoubtedly continues to be, an utter disregard for the radio laws. Government and commercial communication has suffered interference at the hands of the amateur many times, but little attention is given to the fact that many instances are on record where messages have been forwarded through the assistance of an amateur station, when the efforts of the larger stations were fruitless. And amateurs throughout the country are organizing clubs having for one of their main objects a set policy for "operation within the law." It must not be forgotten that the amateur development of today finds its commercial application tomorrow, and the amateur becomes the manufacturer, designer or operator.

To suppose that eliminating the amateur would be of value to our communicating system seems rather shortsighted. It would reduce the amount of interference, to be sure, but it would also reduce the pace at which radio development is moving. It would eliminate a field of pleasant and instructive occupation for the youth, who would confine their young enthusiasm to other pursuits,

some of which might be afterward regretted. It would do away with the preliminary education, self-accomplished, which has aided us in the war and is now aiding us in commercial development. Many of the radio engineers of the country would not be in the positions they now hold, were it not for the fact that their interest in radio was nurtured when they were youths.

It must be thoroughly understood that there has been a more direct application of improvements by the experimenters than we meet in the commercial installation, due to the radio patent situation and the failure of some of the interested companies to get together for their mutual good. The amateur has perfected his apparatus to a degree which enables him to carry on his correspondence with other amateurs without interference from the commercial or government stations, except in some extreme cases, even though there are many instances of commercial stations not living within the law, and causing interference in the amateur's already contracted field.

What Is Needed

Instead of trying to abolish the amateur and pass radio blue laws, it would be far better for the interests concerned and for the country in general to encourage amateur endeavor, make use of some of the inventions of these earnest workers and instead of complaining about the damage they are doing, provide enough supervision of the ether for making those among them, who need compulsion, to live within the law. It will be found, by the earnest and just observer, that the majority of those engaged in the amateur practice are men and youths of accomplishment, who desire to work according to the regulations and are doing all possible for the cutting down of interference caused by the less experienced or the selfish and inconsiderate within their ranks. Constructive legislation will do a great deal of good, while other forms will kill the goose which lays the golden egg.

DAYLIGHT TRANSCONTINENTAL RADIO SIGNALS IN MOVING AUTOMOBILE

SIGNALS sent out by Atlantic Coast stations were recently received at midday by apparatus carried in an automobile moving along the streets of San Francisco. The demonstration was made in connection with the automobile show then being held in this city and is believed to be the first time that such long range daylight signals have been received by light portable equipment of this sort.

The antenna consisted of a stranded copper wire aerial hung about ten feet above the ground by means of bamboo poles at the front and rear of the automobile. The frame of the machine served as a "ground." The signals were clear and of excellent audibility without the use of amplification, only one bulb being used. A standard Colin B. Kennedy long-wave receiver was employed. Except for the six-volt storage battery for lighting the filament of the bulb, the

(Continued on page 300)

6ZK HEARD IN NEW YORK. HONOLULO HEARS 6ZR

MR. A. E. BESSEY has just received verification of the reports that he was heard by 2TT in New York City on the morning of January 15th at 5:05 A. M. Eastern time. Mr. Bessey was calling 9ZN by appointment but was not heard by 9ZN. An amateur station in Defiance, Ohio, heard the signals very QSA at the time that they were intercepted by 2TT. This is a remarkable record and worthy of congratulations from the entire amateur fraternity of the West. In line with Mr. Bessey's cross-continent record is the good news from Honolulu, informing us that 6BJ was heard during the last Hawaiian Transmitting Contest. The reports are herewith published in full:

Honolulu, T. H.,
February 7, 1921.

Mr. P. R. Fenner,
Editor, P. R. N.,
San Francisco, California.
Dear Sir:

In regard to the second trans-Pacific radio test of February 5th and 6th, I wish to state that on the first night of the test, February 5th, I was able to pick up a medium tone spark station working on wave length slightly above 200 meters.

Owing to very heavy QRN and the weakness of the spark signal, I was unable to pick up any of the message except the call which was 6BJ. The time that this station was received was between 7 P. M. and 7:03 P. M. Honolulu time.

I am making no claim that I received a coast amateur station, and the above statement may be proved to be incorrect, but to satisfy my personal curiosity I would like to know if the amateur station 6BJ was working at the time named by me.

Thanking you for a reply, I remain,
Yours very truly,

Kenneth A. Cantin.

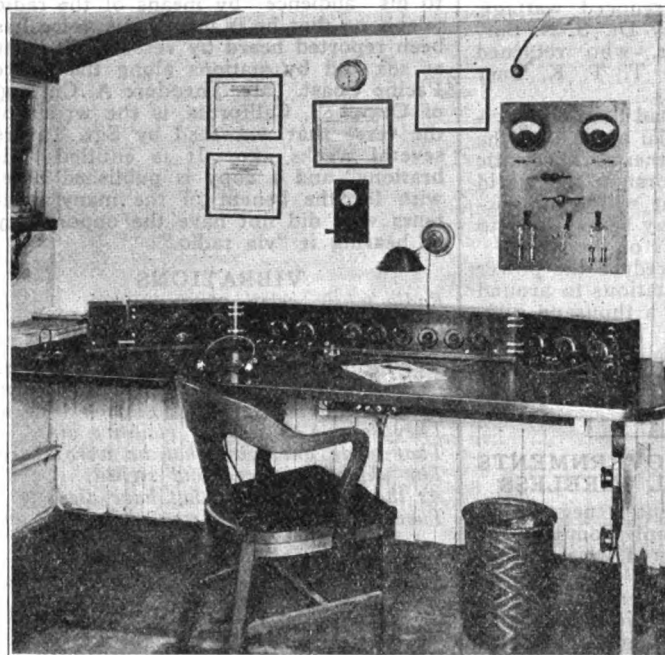
Kenneth A. Cantin,
1593 Piikoi Street,
Honolulu, T. H.

Honolulu, Hawaii,
February 11, 1921.

Dear Dickow:

I now hasten to give you the dope on the amateur test held on February 5th and 6th as far as I am concerned, in an unofficial capacity.

On the two nights allotted to the test I had all my apparatus at the Wahiawa station of the Mutual Tel. Co.



The Equipment Shown in this Photo is of
"The Radio Shop" Manufacture

The Radio
Station of Mr.
A. E. Bessey,
Sunnyvale, Calif.,
Mr. Bessey
Uses a six-step
Amplifier.
This is one of
The most
complete
Stations in the
United States.
Note the uni-
formity of the
Apparatus.

I had as assistants Mr. Westlake, the chief operator, and his assistant, Mr. Seymour, and we used a Grebe Type C. R. 3 short wave set and a De Forest Audio Panel in conjunction with a Magnavox, three stage amplifier, with three pairs of phones hooked in.

On Saturday night, through static the worst I ever heard, we could hear several rotary gap sets working and all we could get was a station calling N. P. M. on about 210 meters but could not get his signature although the other boys made statements, not for publication, which, coming from two totally disinterested parties, convinces me beyond all shadow of a doubt that the amateur station on the coast can and will be read here when the Q. R. N. lets up.

Because of the fact that Mr. Mulrone and I agreed that we would make no claims unless we copied at least one message in its entirety I have notified the Press that the tests were not successful on account of static.

On Sunday night the static was so bad that we could not wear the phones and gave up at seven p. m. for that reason. I suggest for the next test that the transmitting be done from this end as I believe that static conditions are not quite as bad on the coast as here.

Please note that this letter is not in any way making claims as it whether we heard the coast or not but you can read between the lines.

I will state for your information that any night when the big arc is out and static conditions normal I can hear station after station "chewing the fat" and they certainly are not in Hawaii.

With certain improvements that I am working on in connection with short-wave barrage receivers, I gamble that I will send you a copy of certain coast amateur stations which will then convince the skeptics, both here and on the coast, that "it can be done."

Yours fraternally,
Thos. C. Hall.

Honolulu, February 11, 1921.

LONG DISTANCE STATIONS ENTERED FOR ELIMINATION CONTEST

APPPLICATIONS for participation in the coming elimination contest with ships at sea have been received from practically every important amateur station on the Pacific Coast. 6EA, 6EB, 6ZE, 6ZR, 6ZK, 6GP, 7ZJ, 7BJ, 6ED, and many others are among the first to apply for participation.

It is proposed to have ten amateur stations call during the first half of one hour and ten others during the first half of the next hour, regularly every night for seven or eight successive nights. Arrangements to conduct the

test are at present under consideration by the various radio companies controlling the vessels that will listen for the amateurs.

NAVY TO INSTALL COMPASS STATION

Four more radio compass stations on the Southern California coast have been authorized by the Navy Department and work of construction will start March 15, according to announcement made by Rear Admiral Roger Welles, commandant of the Eleventh Naval District.

These stations will be located at Imperial Beach, Point Arguello, Point Firmin and Point Hueneme.

The stations at Imperial Beach, with the new radio compass plant on Point Loma, will handle all ships asking for correct navigational courses in the vicinity of San Diego during foggy or thick weather.

The stations at Point Arguello and Point Hueneme will handle ships passing through the Santa Barbara channel, and the station at Point Firmin, with a second plant at Newport, will take care of the harbor of San Pedro.

A total of nineteen radio compass stations are to be established on the Pacific Coast. Several of these are already in commission.—San Diego "Union."

LOW POWERED RADIO ANNOUNCED BY EXPERT

Successful experiments with a new type of radio receiver that will carry message with greatly reduced wattage, was reported recently by Dr. S. N. Baruch, electrical engineer, who returned from Honolulu on the T. T. K. liner "Shinyo Maru."

Barush explained he had been conducting experiments in Hawaii because of the atmospheric conditions there. The static there is reported the worst in the world and radio apparatus that will work successfully at Honolulu may be expected to operate in all other parts of the world.

"The receiver should reduce the power needed for the largest stations to around ten kilowatts instead of a thousand kilowatts," he said.

Baruch was chief engineer for the Federal Radio Company at Palo Alto for several years.—San Francisco "Examiner."

THREE FOREIGN GOVERNMENTS SEEKING FEDERAL WIRELESS

The Danish government is negotiating with the Federal Telegraph Company for erection of a high powered wireless station at Copenhagen, and the Belgian government has made overtures to the company regarding a plan for stations at Brussels and in the Congo. This was made known at the Federal's annual meeting by President R. P. Schwerin, who added that preliminary work on the huge Chinese contract that is being protested by Great Britain, Denmark and Japan, is being proceeded with in anticipation of the protests being "cleared up."—San Francisco "Bulletin."

KITSAP COUNTY RADIO ASSOCIATION FORMED

A preliminary meeting of all interested, on the evening of February 24, the Kitsap County Radio Association was formed, with an initial membership of twenty-four boys and men, all of whom were enthusiastic over the proposed activity.

A president and secretary-treasurer was elected, the former being George Dewey of Bremerton, and the latter office filled by Travers Campbell, also of Bremerton.

Two committees were appointed, a Rules and Regulations Committee, to draw up a suitable constitution, and a Housing Committee, to investigate the possibilities of obtaining a suitable meeting place.

It was agreed that the meetings would be held at 8 p. m. Thursday evenings, and the monthly dues would be 50 cents per member. No entrance fee was to be charged.

Two licensed commercial operators of long experience, H. S. Pyle and H. R. Andrews, will serve as an advisory board and present papers dealing with the practical operation and construction of various pieces of apparatus from time to time. They are also at the service of the club in the capacity of consulting engineers.

A cordial invitation is extended to all Kitsap County men and boys who are interested to attend the meeting and become members. The secretary will be glad to answer inquiries as to where the next meeting will be held. The club also will be glad to welcome visitors from other radio clubs, and solicit their correspondence.

Address inquiries and correspondence to the secretary, Travers Campbell, 1534 Elizabeth Avenue, Bremerton, Wash. Telephone 386J.

SGT. TAVERS, who has been operating station 6XW at the Presidio of San Francisco, has read several verses to his "audience" by means of the radio telephone that he is using. His voice has been reported heard by vessels 750 miles at sea and by stations along the entire Pacific Coast. Mr. Theodore A. Cutting, of Campbell, California, is the writer of the verse that was read by Sgt. Tavers several weeks ago. It is entitled "Vibrations" and a copy is published herewith for the benefit of the many amateurs who did not have the opportunity of hearing it "via radio."

VIBRATIONS

*Radio music, estatic, high,
Falling clearly from the sky;
Nothing since God's first creations
Has thrilled mankind like these vibrations!
Last Wednesday night soon after seven,
I heard the Hawaiians sing from heaven,
They sang a sweet and plaintive air
That made one wish that he were there.
The ukulele twanged and sighed,
As though for lovers that have died.
Then spake a voice from the great unknown,*

*Deliberate in its monotone.
From space it came, to space it sped,
It addressed the living and the dead.
"Just a minute," spake the voice,
The world waited; it had no choice.
It listened in doubt and troubled gloom,
It dared not hope, yet feared its doom.
But the voice returned with a tone of cheer,*

*Full resonant, and strong, and clear—
And more than that—it seemed quite near;
Instead of listing the poor world's faults,
"We'll have first a two-step and then a waltz!"*

*'Twas Taver's voice, as all hams know,
Vibrating from the Presidio,
Long may its oscillations flow!!*

—Theodore A. Cutting.

Station 6XW operates on a wavelength of 345 meters. Radio concerts are transmitted on Sunday nights from 7 P. M. to 8 P. M. and on Wednesday nights from 8 P. M. to 9 P. M. The radio telephone station at 175 Steuart St., San Francisco, operated by Mr. A. F. Pendleton of the Radio Telephone Shop, transmits press by voice and CW on Tuesday and Friday evenings from 8 P. M. to 9 P. M. Several musical numbers are also provided on both nights. Signals from Mr. Pendleton's station (6UV) have recently been heard with good audibility in Portland, Oregon.

CW STATIONS HEARD AT AVALON

The following communication has been received from Mr. J. Stevens, Avalon, Cal.:

Editor "Pacific Radio News,"

San Francisco, Cal.

Dear Sir:

It may interest you to learn that I am still in the wireless game and am the same enthusiastic radio bird. I have installed a station at Avalon, using a Grebe short wave receiver and one step amplifier. The aerial consists of one wire, 90 feet long and 40 feet high. Have heard most all the amateurs in California and am able to read the following: 9LR, 7YA, 7CC, 5ZA, 5IF, and am also surprised to hear the following CW stations: 7ZI, 9XM, 9XI, 9XG, 6IT, and all the Los Angeles men.

March 11, 1921.

AMRAD TRANSCONTINENTAL LINE—BULLETIN 5— FEBRUARY 18, 1921

Results of February 15th Test: This time success. A bit of radio history was made when three messages were relayed from coast to coast solely by Amrad Gap stations under usual conditions of QRM and quite heavy QRN in the East. We appreciate deeply the services of those who have contributed to making fame for the Amrad Quenched.

At 1XE: QRN heaviest of the season. No dx heard, except 2PL.

At 1TS: QRN terrific. Heard 1XT, 3VV, and 8ML. 1TS doing great work since getting tuned up. Worked 8OJ, 8MH, 8AB, 8ID, 8ES, 3GO, 3VV, 8WY, 8ZD, 8AIO, 8XE, and 3PB, 2CF Canadian.

At 1XT: The star of test on QST to 8ML. Cleared No. 11, No. 13 and No. 15 to him. Worked 2PL, 1VAA, 3VV, 8ID, 9PV. Heard 2RK, 3IP, 8TT, 8KK, 8ZL, 8BO, 8FK.

At 2PL: QRN heavy until daylight. Worked 3VV, 1XT, 8ML, 8KK, 8RQ, 8AMZ. Took eastbound No. 6 direct from 9PV. Took No. 8 from 8ML the most QSA dx station ever recorded by 2PL. Could be copied all night clear across room; no QSS.

At 3VV: Heavy QRN and QRM. Worked 1XT, 2PL, 8ML, 8ZL. 1XT faded out for good at 2:45. Heard 9PV QRS No. 6 and No. 8 east. Says the Quenched seems to get through dead air better than rotaries.

At 8ML: Heavy local QRM. Worked 1XT, 2PL, 3VV, 9PV, 2AER. "Why do you choose nights with so much QRN?" he asked 2PL. "My eyes opened to Amrad possibilities," says 8ML.

At 9PV: Heard 1XE, 3VV, 8FK. Took eastbound No. 6 and No. 8 from 9AFX 3:09 and 3:20 C. S. T. Took westbound No. 11, No. 13 and No. 17 from 8ML. Took No. 15 direct from 2PL.

At 9AFX: Took No. 13 westbound direct from 8ML. Copied part of No. 15 direct from 2PL. Copied all of No. 11 and No. 13 direct from 8ML. 9AFX turned in before No. 17 westbound arrived.

At 5ZA: 5ZA copied No. 6 eastbound direct from FD. Heard 8ML working 1XT. No. 6 east and No. 15 west crossed at 5ZA, 12:45 a. m. Pacific Time.

Thursday Morning, February 24th: With improved organization and a fair night we hope to increase our speed. The best one way time made so far was with No. 15 westbound, 2PL to FD in approximately 25 minutes. Both eastbound and westbound messages will require immediate answers from the Atlantic and Pacific stations which receive them. Westbound MSGS will be No. 19, No. 21, No. 23. The same time schedule will be followed but note the substitution of Thursday for Tuesday morning in this next test. We propose to have additional relays on March 15th, April 12th, May 17th, and June 14th. We would appreciate receipt of call letters of any new DX Amrad stations you may have heard. Eventually we hope to organize a chain of Amrad Gap stations encircling the United States. 73's. 2PL.

Calls Heard By Western Amateurs

List of Heard and Worked Calls by 6EJ
During the Three Winter Months

5XD, (5ZA), (6AAB), (6AAK), (6ABA),
(6ABP), (6ACY), (6ADU), (6ADX),
(6AHU), (6AIL), (6AIO), (6AJH), (6BQ),
(6DA), (6DK), (6DH), (6DP), (6EA),
(6EB), (6EC), (6ED), (6EK), (6EL),
(6EN), (6ER), (6EV), (6FE), (6FT), (6GE),
(6GP), (6HH), (6HY), (6IF), (6IG),
(6IL), (6IU), (6IV), (6JD), (6JI), (6JJ),
(6JT), (6MH), (6MN), (6MZ), (6NY),
(6OH), (6OL), (6OT), (6PE), (6PO),
(6PR), (6QY), (6RE), (6RS), (6SK),
(6TF), (6TL), (6VL), (6XZ), (6ZA),
(6ZB), (6ZH), (6ZL), (6ZM), (6ZN),
6ZO, (7AD), (7BJ), (7BP), (7BR), (7CW),
(7DA), (7DH), (7IM), (7IN), (7IU), (7IR),
7YA, (7YS), (7ZB), (7ZJ), (7ZK), 8ZA,
8ZR, 9AEG, 9EL, 9HI, 9LR, 9YW.

Above listed only includes stations that
exceed 100 miles. 6EJ reported heard in
Columbus, Ohio.

Additional Calls Heard by 6JJ Between
January 25 and March 1

(5ZA), (6AE), (6AR), (6AT), (6AH(cw)),
6ABG, (6ABM), 6ACR, 6ADG, (6ADL),
(6ADX), (6AGF), 6AGP, 6AHU,
(6AIO), 6AID, 6AJH, 6BAA(cw), 6BAB
(cw), 6BAC(cw), 6CH, (6DA), (6DP),
(6DS), 6DD, (6EA), (6ED), 6EP, (6GP),
6HR, (6IC), (6IF), (6IS), (6JD), (6JI),
6JQ, 6JR, 6KC, (6KP), 6KM, 6KL,
6LQ, 6MK(cw), (6OC), (6OW), (6RN),
(6SK), 6TS, 6TV, 6VL, (6WN), (6XZ),
6ZO, (7BC), (7BQ), (7BP), 7BK, 7CW,
7DH, 7DM, 7ED, 7EX, 7FL, (7IN),
7JR, (7KT), 7MA, 7YI, (7ZI), (7ZJ),
(7BJ), 7KX, 9HT and 9AVS.

Calls Heard by Radio 6ACM

5ZA, 6AJ, (6AK), 6AY, 6BQ, 6CV,
6DH, (6DK), 6DP, (6EA), 6EB, 6EC,
6ED, (6EJ), (6EN), (6ER), 6FE, 6FH,
6FS, 6GI, 6GP, 6HH, 6HY, (6IC), 6ID,
6IF, 6IL, 6IR, 6IV, (6IY), 6JD, 6JI,
6JJ, (6JQ), 6KA, (6KP), 6OH, 6PQ,
6QR, 6RE, 6RN, 6SK, 6TB, 6TC, 6TL,
6UM, 6WC, 6WR, 6XZ, 6ZA, 6ZM,
(6ZN), 6ZO, 6AAB, 6AAK, (6AAT),
(6ABP), (6ACA), 6ACR, (6ACY), 6AGF,
6AGP, 6AHA, 6AIK, 6AIL, (6ALA),
6MQ, 7AD, 7BC, 7BJ, 7BK, 7BP, 7CC,
7CN, 7CW, 7DA, 7DS, 7ED, 7EW,
(7GQ), 7GY, (7IN), 7PK, 7YA, 7YS,
7ZI, 7ZJ, 7ZK.

Anyone hearing 6ACM please QSL.

**CALLS HEARD AT 6TL, JANUARY
22 TO FEBRUARY 22.**

5ZA, 6AE, 6AH, 6AI, 6AK, 6AR,
6AT, 6CP, 6DK, 6DP, (6EJ), 6EX,
6HH, (6IC), 6IG, 6IY, 6JI, 6JJ, (6JN),
6JR, 6KL, (6OC), 6PR, (6QR), 6TC,
6TF, 6TV, (6XZ), 6ZA, 6ZB, 6ZH,
6ZM, 6ZO, 6ZR, 6ACA, 6ACM, 6AG,
7BQ, 7DA, 7IN, 7YA, 7ZI, 7ZJ.

Using only one tube and heard before
9:30 P. M. or after 1:30 A. M.

ERRATA

The station of Mr. C. Maass (6AKH)
is located at 250 21st avenue, San Fran-
cisco, instead of 520 21st avenue, as list-
ed in the call directory of our last is-
sue.

SIXTH AND SEVENTH DISTRICT AMATEUR STATIONS

Amateur Calls Issued to March 8, 1921, Radio Inspector, San Francisco, Cal.

Call	Name	Residence	Location
6AKO	C. Bauman	Box 14	Auburn, Cal.
6AKB	E. Jones	629 San Francisco St.	Auburn, Cal.
6AKQ	H. H. Hunt	1319 Napa St.	San Mateo, Cal.
6AKR	H. E. Williams	1035 Sierra St.	Vallejo, Cal.
6AKS	J. Hauschild	40 Goethe St.	Reno, Nev.
6AKT	J. Insand	813 Third St.	Daly City, Cal.
6AKU	F. Comyns	638 Ryland St.	Modesto, Cal.
6AKV	H. L. Winer	120 Maple Ave.	Reno, Nev.
6AKW	L. R. Potter	516 N. Gertrude St.	Fullerton, Cal.
6AKX	A. L. Young	185 E. San Fernando St.	Rendondo Beach, Cal.
6AKY	N. J. Becar	938 Sonoma Ave.	San Jose, Cal.
6AKZ	E. Catendo	320 N. Pickering Ave.	Sebastopol, Cal.
6ALA	A. H. Saare	1088 Sixty-third St.	Santa Rosa, Cal.
6ALB	J. L. Davis	1500 N. Los Robles Ave.	Whittier, Cal.
6ALC	F. Vettel	5107 Eleventh Ave.	Oakland, Cal.
6ALD	R. Taggart	100 W. Main St.	Pasadena, Cal.
6ALE	W. W. Lindsay	803 Forty-fifth St.	Los Angeles, Cal.
6ALF	G. S. Corpe	2223 Jefferson St.	El Monte, Cal.
6ALG	A. L. Blodgett	408 Palm Ave.	Los Angeles, Cal.
6ALH	B. Wright	315 S. Orange Grove St.	Ogden Utah.
6ALI	P. Murphy	1304 E. Worth St.	Salida, Cal.
6ALJ	W. E. Seivers	719 Rampart St.	La Habra, Cal.
6ALK	R. A. Hancock	290 E. Tenth St.	Anaheim, Cal.
6ALL	F. Weyerhausen III	1605 E. First St.	Pasadena, Cal.
6ALM	F. Lee	235 Orange St.	Stockton, Cal.
6ALN	M. F. Ferren	469 Twenty-fifth Ave.	Los Angeles, Cal.
6ALO	C. J. Reikeberg	4105 Twentieth St.	Pomona, Cal.
6ALP	H. Brown	25 Northwood Drive	Los Angeles, Cal.
6ALQ	R. Merrill	1016 Fourth Ave.	Oakland, Cal.
6ALR	Roy Donovan	1926 Park St.	San Francisco, Cal.
6ALS	R. I. Ludwig	422 Vernon St.	San Francisco, Cal.
6ALT	H. G. Peery	3020 Champion St.	San Francisco, Cal.
6ALU	R. P. McKenzie	9401 E. Fourteenth St.	Los Angeles, Cal.
6ALV	O. Zimmerman	8925 E. Fourteenth St.	Alameda, Cal.
6ALW	C. Champney	154 Fifteenth Ave.	Oakland, Cal.
6ALX	W. A. Hammond	467 S. First St.	Oakland, Cal.
6ALY	E. Koerper	1819 San Andreas St.	Oakland, Cal.
6ALZ	M. W. Sutliff	P. O. Box 100	Oakland, Cal.
6AMA	G. H. Freyermuth	Pacific Union College	Oakland, Cal.
6AMB	R. J. Stull	242 Elm St.	Oakland, Cal.
6AMC	C. Fee	318 Trinity St.	Oakland, Cal.
6AMD	L. R. Cormack	642 N. Newlin St.	Oakland, Cal.
6AME	R. H. Potts	Glen Una Ranch	San Francisco, Cal.
6AMF	C. A. Leal	State Hospital	San Jose, Cal.
6AMG	F. A. Burrows	1737 Mission St.	Siswon, Cal.
6AMH	S. Haughton	1725 Downey Ave.	Santa Barbara, Cal.
6AMI	G. O. Brown	N. Orange Grove Ave.	Riverbank, Cal.
6AMJ	N. D. Foster	7155 Converse St.	Irvington, Cal.
6AMK	R. J. Miller	4170 Glen Allyn Drive	St. Helena, Cal.
6AML	F. Burgess	72 Henry St.	San Mateo, Cal.
6AMM	G. F. Crowley	Tucson Ave. and E. Fifth St.	Vallejo, Cal.
6AMN	A. A. Crawford	3793 Thirty-first St.	Whittier, Cal.
6AMO	W. K. Downey	1312 Ninety-seventh St.	Los Gatos, Cal.
6AMP	H. G. Morgan	R. F. D. 2	Agnews, Cal.
6AMQ	H. M. Woiham	2716 Pacific Ave.	Port Costa, Cal.
6AMR	R. F. Jennings	807 Prospect Row	South Pasadena, Cal.
6AMS	F. W. Hadley	Route B, Box 270	Modesto, Cal.
6AMT	P. P. Boardman	1210 Eleventh St.	Pomona, Cal.
6AMU	T. E. Robinson	2600 Woolsey St.	Los Angeles, Cal.
6AMV	A. P. Montiero	Box 368	Los Angeles, Cal.
6AMW	W. E. Wohler	Box 368	San Francisco, Cal.
6AMX	J. P. Bradley	435 Mission St.	San Francisco, Cal.
6AMZ	Sanger U. High School	2829 Tenth St.	Sanger, Cal.
6ANA	H. A. Mauser	639 E. St.	San Mateo, Cal.
6ANB	E. Gassman	12 Hayward St.	Fresno, Cal.
6ANC	F. W. Donkin		Modesto, Cal.
6AND	J. H. Gibson		Berkeley, Cal.
6ANE	B. M. Spencer		Gridley, Cal.
6ANF	B. M. Spencer		Gridley, Cal.
6ANG	B. Harper		San Francisco, Cal.
6ANH	T. E. Soderlund		Berkeley, Cal.
6ANI	D. E. Chambers		San Diego, Cal.
	E. Thayer		San Mateo, Cal.

Seventh District Amateur Stations

Call	Name	Residence	Location
7IA	J. E. Jenkins	Route 2	Olympia, Wash.
7IB	J. G. Nordahl	809 Twenty-fourth Ave. N.	Seattle, Wash.
7IC	Albert Onsum	806 E. Fifty-fifth St.	Seattle, Wash.
7ID	Benedict Barr	Mt. Angel	Benedict, Ore.
7IE	C. J. W. Tibbetts	1813 Broadway	Helena, Mont.
7IF	R. M. Dansfield	662 Charnelton St.	Eugene, Ore.
7IG	P. B. Jackson	434 Broadway	Seaside, Ore.
7IH	G. W. Selvidge	4321 Ninth Ave. NE	Seattle, Wash.
7IJ	A. B. Rotering	Box 43	Glasgow, Mont.
7IK	Harry H. Olson	310 Fourth Ave.	Seaside, Ore.
7IL	T. C. Hall	1126 Taylor St.	Eugene, Ore.
7IM	L. J. Simms	311 N. Twenty-seventh St.	Billings, Mont.
7IN	A. L. Adams	321 W. Main St.	Silverton, Ore.
7IO	H. E. Welch	Route 8	Salem, Ore.
7IP	A. A. McCue		Kalwook, Alaska.
7IQ	Donald C. Gannon	Central Ave.	Kent, Wash.
7IR	J. R. Harris		Cohagen, Mont.
7IS	F. W. Lawrence	406 S. Crosby St.	Tacoma, Wash.
7IT	Roy Anderson		Ketchikan, Alaska.
7IU	George Mecham	7748 Wilson Ave.	Seattle, Wash.
7IV	Arthur Fletcher	Woodbine St.	Boise, Idaho.
7IW	F. R. Hoppe	633 Willamette St.	Eugene, Ore.
7IX	T. L. Estes		Snohomish, Wash.
7IY	Danzil Cutler		Vashon, Wash.
7IZ	Chas. Burson	1921 Third Ave.	Seattle, Wash.
7JA	E. L. Crawford	1340 Court St.	Salem, Ore.
7JB	Fred H. Stephens	822 Halsey St.	Portland, Ore.
7JC	Keith Frazier	829 Third Ave.	Glasgow, Mont.
7JD	Francis McKee		Cambridge, Idaho.
7JE	H. C. Boardman	112 W. Fifth St.	Port Angeles, Wash.
7JF	Claude Anderson	5095 Washington St.	Moscow, Idaho.
7JG	H. R. Drinker	497 E. Sixteenth St.	Portland, Ore.
7JH	J. D. Hertz	Route 3	Vancouver, Wash.
7JI	Albert McGuffin	346 First Ave. N.	Glasgow, Mont.
7JA	Radio Corp. of America		Portland, Ore.
7JB	Montana State College		Bozeman, Mont.
7JC	Kilbourne & Clarke Co.		Seattle, Wash.
7JD	Univ. of Washington		Seattle, Wash.
7JE	School District No. 10		Boise, Idaho.

(Calls Heard by Western Amateurs--
Continued.)

**HEARD BY I.A. WEIHE, AT
SPARKS, NEVADA**

No amplification necessary

6ACA, 6ACM, 6ADL, 6ADQ, 6AH,
6AI, 6AJ, 6AN, 6AT, CDK, 6DP, 6EA,
6EB, 6EG, 6EJ, 6EK, 6EN, 6ER, 6FE,
6GE, 6GP, 6HH, 6HY, 6IH, 6JD, 6JI,
6JR, 6MY, 6OH, 6OT, 6PQ, 6PR, 6QR,
6SK, 6ZM, 6ZN, 6ZO, 6ZR, 7CC, 7DA,
7EX, 7GJ, 7IN, 7ZI, 6MX, 6IF, 6PR,

7GQ, 7PQ, 6ACR, 6AGF, 6ZR, 6SK,
6OC, 6GY, 6AT, 7BJ.

This is with a Tresco 200-meter tuner.

**CALLS HEARD AT 6FZ, BER-
KELEY, CALIF.**

6AT, CDH, 6EB, 6ED, 6EK, 6FH,
6FI-cw., 6GP, 6HH, 6IC, 6IU, 6KM,
6KS, 6MN, 6OT, 6OW, 6PO, 6QR, 6TC,
6ZA, 6ZM, 6ZN, 6ABP, 6ACR, 6ADA,
6ADL, 6AFN, 6ALA, 7BC, 6BJ, 7BP,
7BQ, 7BZ, 7CC, 7DA, 7DP, 7ED, 7FB,
7LN, 7ZJ.

CALLS HEARD AT RADIO 6EB

5XD, (6AE), (6AT), (6BJ), (6BQ),
6BX, (CW), 6CH, 6CZ, 6FI, 6GK,
(6HC), 6HH, (6IG), 6JJ, 6JT (6KL),
6MQ, (6OH), 6PO, 6QY, (6TV), (6ZK),
6ZO, 6ZR, "FD", (7BP), 7BQ, 7CW,
(7DA), 7DR, 7DS, 7FB, (7GQ) (7IN),
(7YA), 7ZJ, 7ZK, 6AAL, 6AAW, 6ACI,
6ACM, (6AFN), 6AIL, 6EB heard at
9CA.

**CALLS HEARD AT 6AIL, DECEM-
BER 15 TO FEB. 15, SELMA, CAL.**

5HH, 5ZA, 6AF, 6AH, 6AK, 6AM,
6AN, 6BJ, 6BK, (C.W.), 6CD, 6CV,
6DA, 6DH, 6DJ, 6DK, 6DM, 6DP, 6DT,
(C.W. phone), 6DW, 6EA, 6EB, 6EJ,
6EL, 6ER, 6FE, 6FI, 6GA, 6GF, 6GI,
6GM, 6GT, 6GS, 6HH, 6IC, 6IF, 6IG,
6IH, 6IK, 6IV, 6JD, 6JE, 6JI, 6JJ, 6KM,
6LO, 6LR, 6MK, 6PC, 6PG, 6PO, 6PQ,
6PR, 6QK, 6QR, 6QS, 6SK, 6TC, 6TF,
6TO, 6UB, 6UC, 6XZ, 6ZA, 6ZH, 6ZN,
6ZR, 6AAT, 6ABP, 6ACV, 6ADL,
6AFN, 6AFY, 6AJY, 7AR, 7BD, 7BQ,
7BV, 7CC, 7CJ, 7DO, 7FI, 7FL, 7GK,
7GM, 7GY, 7IN, 7IR, 7IY, 7LN, 7ZI,
7ZJ.

**CALLS HEARD AT RADIO STA-
TION, 5JY, DALLAS, TEXAS**

(5AI), (5AJ), 5AL, 5AO, 5BV, 5BJ,
5BI, (5BM), (5CE), (5CG), (5CI),
(5DW), 5EA, 5ER, 5ES, (5EW), 5EG,
5EL, (5FE), 5FB, (5GU) (5HF), 5HI,
(5HV), 5IC, 5IE, 5IF, (5IP), (5IH),
(5IS), 5JA, (5DJ), (5JG), (5JL), 5JE,
5JC, (5JT), (5JU), (5KF), 5KK, (5LC),
(5LR), 5LS, (5LT), 5MC, 5MF, 5XA,
5XB, (5XG), 5YH, 5ZA, (5ZB), (5ZC),
5ZE, 5ZF, (5ZG), 5ZK, 5ZL, 5ZP, 5ZR,
5ZS, 5ZU, 5ZW, 5ZX, 8CO, 8KP, 8HG,
8AKV, 9AAV, 9AAC, 9AEG, 9AEQ,
9AFX, 9EL, 9FU, 9HI, 9JA, 9JN, 9LA,
9LR, 9LC, 9OE, 9OR, 9UQ, 9WU, 9XM.

**Calls Heard by Hugh Compton, San
Diego, Cal., on Crystal**

5ZA, 6AK, 6AQ, 6EN, 6IL, 6IG, 6JD,
6KP, 6MZ, 6OC, 6SK, 6UM, 6ZA, 6ZN,
6AAK, 6ABP, 6AIL.

**Calls Heard by Wm. D. Wood, 6KL,
Feb. 1 to 26 (Oakland, Cal.).**

5ZA, 6ED, (6EB), 6EN, (6ER), (6CZ),
6DP, (6GF), 6HH, 6IG, (6JD), 6JM,
(6KA), (6KP), (6PR), 6PQ, 6OT, 6RN,
6SK, 6ZA, (6ZN), 6ACA, 6AET, 6HY,
6AGH, (6BK), 6IL, (7BO), 7BP, (7DA),
(7CC), 7ED, (7GQ), 7FK, 7YA (7ZI),
(7ZJ), 9LR.

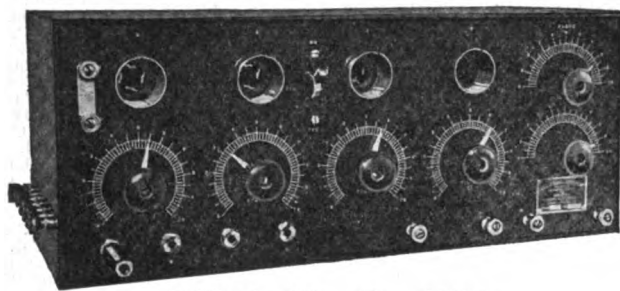
**Calls Heard by S. S. "Steel Inventor"
(KDJL) at Seattle Wash.**

5ZA, 6EB, 6ZM, 6ER, 6OT, 6DD,
6AFD, 6SV, 6DP, 6AFN, 6VS, 6CC,
6AT, 6JD, 6AK, 6PM, 7FL, 6AN, 6AE,
8:46, 6ZM, very QSA; 8:47 p. m., 6LR,
very QSA; 9:10, 6ZR, very QSA; 9:18
p. m., 6VX, QRK.

Calls Heard by 6ZH, Richfield, Utah

(5ZA), 5XB, 5XD, 5IH, 5IF, 5BI,
5ZJ, 5ZL, 5ZP, 5JT, 5ZT, (6JT), 6ZA,
(6ZM), 6EC, 6EB, (6EJ), 6ZN, (6IG),
(6RE), 6JD, 6FI, 6PO, 6GL, (6MK),
6BA, (6AE), 6WV, mod. (6GE), (6BQ),
6EA, 6JR, (6SK), 6KP, 6VL, (6BJ),
(6EN), 6EB, 6UO, 6PR, 6KA, 6DP,
6OT, (6AK), (6YS), 6IF, 6BP, 6FH,
6IL, 6AK, 6ZR, 6OR, 6AH, 6MH, 6GY,
(6AJX), 6ZX, 6ZO, 6PO, 7EX, 7YA,
(7ZJ), 7CC, 7LN, 7XD, 7JX, (7ZG),
9ASF, 9EE, 9OE, 9YY, 9JN, 9ABX,
9AEG, (9WU), (9LR), 9SC, 9AIG,
(9YW), 9AEY, 9YI, 9LW, 9AEQ,
9AFX.

Do You Like Pigs?



Z-Nith Amplifigon Type AGN-3

No? Well then you probably don't like the pig-like squeal of the ordinary three-step amplifier.

Our Amplifigon Type AGN-3 detector and three-step amplifier absolutely **does not squeal**, but it sure makes signals roar in.

The ideal audion control cabinet for use with a Regenerative Receiver, because of plate battery controls found on **no other** control panel.

Used by 9ZN throughout the record-breaking "Trans-cons," linking the Atlantic and Pacific.

Our new Bulletin F-21, out March 1st, tells all about it, as well as the new Z-Nith Multiceiver and many other new products. If your name is not on our mailing list write us.

The Chicago Radio Laboratory

Offices: 1316 Carmen Ave. Testing Station: 9ZN, 5525 Sheridan Road
CHICAGO, ILL.

RADIO CLUB DIRECTORY

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts. San Francisco, Calif. Meetings every Thursday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

Calls Heard by 6DK

6IV, (6TC), (6AH), 6IV, 6KL, (6AN), (6JR), 6IC, (6AGF), (6ER), (6AIO), 6ABP, 6ABW, 6ACA, (6ADL), 6ADA, 6ACM, (6AGF), (6EA), 6EB, 6EK, (6EX), 6EN, 6FI, (6FD), (6GP), 6HC, (6HH), 6IL, 6IT, (6IF), (6JD), (6KP), 6MN, (6OL), (6OH), 6OC, 6PC, 6PQ, 6QR, (6SV), (6TF), 6TY, 6VH, 6XZ, (6ZN), 6ZH, (6ZR), 6AE, 6AT, (6AK), 6DP, 7AD, 7BP, 7BC (7BQ), 7CC, 7ED, (7GQ), 7IN, 7ZI, (7ZJ). My new address is L. E. Martin, 100 Olive Avenue, Fresno, Cal.

Editor, Pacific Radio News,
Dear Sir:

Have enjoyed reading "Calls Heard" in "Pacific Radio News" and think the publication of same is encouraging to the amateur, especially when he is often prevented working some distant station because of QRM.

Herewith list of stations heard and worked by 6ABP, Long Beach, Cal., from January to February 20, using one electron relay for receiving, and 1/2 KW. Packard for transmitting:

(5ZA), 5IF, 6IG, (6ZH), (6AIL), 6ZR, 6CC, 6AIM, (6EJ), (6IC), 6ACR, 6AGF, 6FI, 6IY, cw., (6XZ), (6HH), (6ZB), (6VL), (6ADA), (6AJH), 6AH, 6FD, 6AE, 6OH, 6OC, 6JR, 6EX, 6AK, 6PR, 6ZA, 6AHM, (6AAW), 6GY, 6AIW, 6JJ, 7BC, (7IN), (7GQ), 7FL, 7ED, 7BG, 7BF, 7DA.

CALLS HEARD BY LEONARD TATE, ANACORTES, WASH.

Canadian: 5CP, 5DC, 5FK, 5LS, 5FL, 5NN, 5BL, 5CJ, 5BA, 6AC, 6AE, 6AH, 6AK, 6AP, 6CH, 6CV, 6DP, 6DA, 6EA, 6EC, 6EJ, 6ER, 6FE, 6FI, 6IC, 6KM spk. and cw., 6KL, 6KP, 6KT, 6LC, 6LM, 6LN, 6MK, 6MO, 6OC, 6OH, 6PI, 6KN, 6TC, 6TV, 6WV cw., 6ZE, 6ZM, 6ZO, 6ZR, 6AAT, 6ACM, 6AFN, 6AFY, 6AGF, 6AGM, 6AOV, 6TAM, 7AD, 7BJ, 7BP, 7BQ, 7BH, 7BR, 7CA, 7CC, 7CE, 7CM, 7CR, 7CW, 7CU, 7DF, 7DS, 7ED, 7EX, 7FI, 7GG, 7HE, 7IN, 7JN, 7KT, 7LJ, 7LN, 7LS, 7XQ, 7YA, 7YG, 7YW, 7YS, 7ZB, 7ZD, 7ZG, 7ZH, 7ZJ, 7ZK, 7ZT, 8EC, 9EE, 9GA, 9LR, 9MF, 9UM, 9UT, 9YW, 9JN, 9YA cw., 9QC, 9ZG, 9AEI, 9AGN.

Here is a list of amateurs I have copied in the last couple of months. Am 76 miles east of Bakersfield in the Kern River Mountains: 6AE, 6AH, 6AR, 6AT, 6BQ, 6DK, 6DP, 6EJ, 6EN, 6ER, 6DA, 6FE, 6FA, 6GI, 6GM, 6GY, 6HC, 6HY, 6ID, 6IF, 6IP, 6IO, 6IR, 6IT, 6IV, 6JJ, 6JM, 6JR, 6KA, 6KP, 6MK, 6NH, 6OH, 6PK, 6PQ, 6PR, 6QY, 6RN, 6SD, 6SK, 6TC, 6TF, 6TU, 6TV, 6VO, 6AJH, 6ACR, 6AFN, 6ZN, 6ZR.

C. P. Altland, Kernville, Calif., Care of Southern California Edison Company., K. R. No. 3.

CALLS HEARD BY ASA S. KELLER CASHMERE, WASH., JAN. 8 TO FEB. 17.

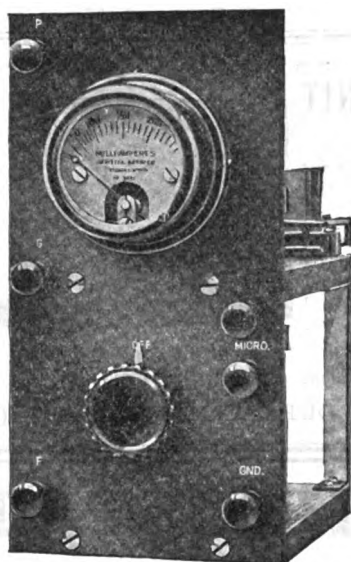
6AA, 6AC, 6AD, 6AE, 6AF, 6AG, 6AH, 6AK, 6AN, 6AS, 6BJ, 6CV, 6DJ, 6DP, 6EJ, 6EN, 6FC, 6FH, 6FI, 6FL, 6GF, 6GK, 6GY, 6HH, 6IC, 6JA, 6JZ, 6KL, 6LH, 6LI, 6LJ, 6LK, 6LR, 6OC, 6OH, 6PQ, 6PR, 6RK, 6ZA, 6ZR, 6ZE, 6AAR, 6ACD, 6AuQ, 6AFY, 6LLI, 7AD, 7BC, 7BH, 7BJ, 7BP, 7BQ, 7CC, 7CH, 7CK, 7CO, 7CW, 7DA, 7DC, 7DI, 7DJ, 7DO, 7DP, 7DQ, 7DS, 7ED, 7EP, 7FB, 7FL, 7GJ, 7GK, 7GQ, 7GY, 7IC, 7IN, 7JR, 7JX, 7JZ, 7LR, 7MD, 7OH, 7OQ, 7RS, 7WC, 7YA, 7ZB, 7ZI, 7ZJ, 7ZK, CLI (one), CL2.

(Continued on page 307)



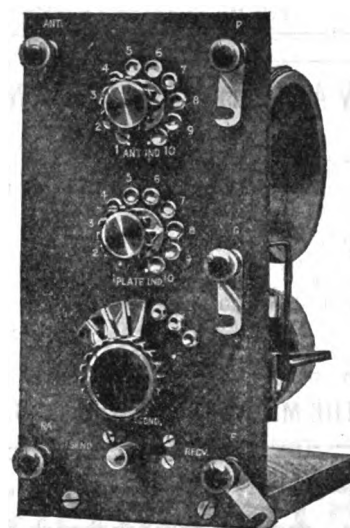
ANY AMATEUR CAN TALK 30 Miles by Wireless Telephone

WITH THIS NEW MIDGET
"RADIOPHONE" * Transmitter



Aerial Oscillating
Circuit Panel

(Type
OT-3)



Power Tube Panel.
(Note clamps for fastening panels
together into simple unit).

*"Radiophone"—name copyrighted.

HERE is the most remarkable radio telephone for its size ever made. Complete in every detail. Works on any source of direct or alternating current, supplying up to 500 volts. Tuning done by tapped switches. Only one 6-volt storage battery required; for filament, microphone and "B" battery. Rectifier or Motor Generator supply may be used. Tests show a 30-mile telephone range, and greater range is possible. Set mounted on two Bakelite panels, each 4 1/2 x 9 inches. Aerial Oscillating Circuit Panel, with all necessary controls and transfer key switch. Price—\$55.00 (without microphone). Power Tube Panel contains tubes, ammeter and filament rheostat. Price—\$45.00 (without tubes or power supply). Entire set well made and nicely finished. Get full details at once. Order early to assure prompt delivery, either through your regular dealer or direct from us.

DeForest Radio Telephone & Telegraph Co.

Inventors and Manufacturers of High Grade Radio Apparatus
1425 SEDGWICK AVENUE NEW YORK, N. Y.



SOMETHING NEW IN HEADSETS



"Navy Type, 50,000 Ohms, A. C., Weight 9 oz., complete with head band and polarity indicating cord.
Price \$14.00

Send 5c for Catalog "C"

With recent improvements in our Navy Type Headset we have succeeded in bringing out a headset with an A. C. resistance of 50,000 ohms at 800 cycles, a thing which has never before been accomplished in a commercial headset. It has a natural high pitch and will bring in thousand cycle notes clearly and distinctly and undamped waves can be read clearly and distinctly through static.

The Improved Navy is peculiarly adapted to vacuum tube reception.

They are permanently adjusted at their highest point of efficiency and then carefully matched in tone. Because of their rugged construction they remain adjusted indefinitely.

The most exacting comparative tests have convinced us that our High Impedance Navy Type Headset is the best on the market, regardless of price. It is the most sensitive, most durable, and at the same time the lightest high-grade headset built. Our guarantee stands back of every one of these claims.

If you need a reliable and super-sensitive headset, you cannot afford to be without this new high impedance model. Send us \$14 and we will mail you a Navy Type Headset. Try it for 10 days. If you are not absolutely satisfied with your purchase, return the headset and we will refund the money immediately.

C. BRANDES, Inc.

Room 819, 32 Union Square, New York City

Also makers of: Trans-Atlantic Headsets, \$12.00.

Superior Headsets, \$8.00.

VACUUM TUBES REPAIRED

RELIABLE SERVICE TO THE RADIO AMATEUR

MARCONI VT's, MOORHEAD VT's,
ELECTRON RELAYS

\$3.50

CASH MUST ACCOMPANY ALL ORDERS

Eastern Vacuum Tube Laboratories

178 Washington St.

Boston, 9, Mass.

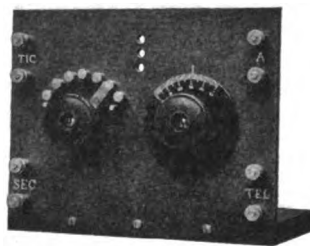
VACUUM TUBE CONTROL UNIT

Type MW

Adapted to any modern hook-up. Best appearing and highest type Vacuum Control Unit at the price in the market.

Grained formica panel, 5½x6¾ ins., lettered in white, graduated rheostat dial, variable plate control. Tube socket (standard 4 prong).

Grid condenser and leak mounted in back of panel and so wired that it can be adapted to any modern hook-up.



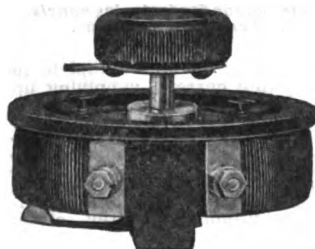
Price \$10

Parcel post prepaid in U. S.
Immediate shipment.

Write for descriptive Booklet MW. Sent free on request

THE MIDWEST RADIO CO., Dept. D. 3423 DURY AVE. CINCINNATI, O.

FILAMENT RHEOSTAT



Type 214A

FOR

PANEL MOUNTING

A 7 ohm rheostat for regulating the filament current in either receiving or transmitting tubes, carries 1.5 amperes. Smooth operation of switch arm. No grating, no clicking. Cut shows Type 214A for mounting back of panel. Type 214B made for portable or front of panel use.

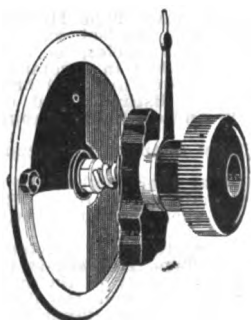
PRICE \$2.50

Made also with resistance of 400 ohms and with potentiometer connection suitable for grid biasing.

PRICE \$4.00

Described in Bulletin 904C

GENERAL RADIO CO., Cambridge 39, Mass.



A New Invention

The Parkin .001 mf Variable Condenser (pat. applied for) fills the long felt want for a rugged, low priced, balanced variable condenser for panel mounting. No plates to bend and short circuit. Cannot get out of order. Has very low minimum capacity. Easily mounted, only one small hole being necessary in the panel.

Guarantee: All Parkin Condensers are sold subject to return within five days if not fully satisfactory.

No. 50 .001 mf Unit alone, may be mounted on any shaft....\$1.50 postpaid
No. 51 .001 mf Unit with knob, pointer, etc., as shown.....\$2.00 postpaid
No. 52 .001 mf Unit with knob, etc., and 3-inch black dial\$2.50 postpaid

Write for full description of this new invention

Ask for Circular No. 16

PARKIN MFG. CO.,

Dealers: Write for discounts

San Rafael, Calif.

MOVING AUTOMOBILE SIGNALS

(Continued from page 294)

entire receiver was self-contained in a cabinet about the size of an ordinary suit case.

The first tests were made on top of Twin Peaks and proved so successful that the automobile was driven down into the city where the signals continued to be clearly audible even when in the traffic near electric cars in operation. Some of the Atlantic Coast stations heard were WSO (Marion, Mass.), NSS (Annapolis, Md.) and WII (New Brunswick, N. J.)

The tests were conducted by Colin B. Kennedy and Emile A. Portal.

RADIO CLUB NEWS

(Continued from page 293)

the other schools follows the suggestion of the University of Washington Radio Club that the schools perfect a method of inter-school communication, especially for the transmission of game scores.

The Gonzaga radio plant, purchased last summer, is ready for use following the erection of suitable aerials. The aerial will be strung up within a month, Mr. Prange stated, and will consist of a four-strand line from the east spire of the St. Aloysius Church to the university roof.—Spokane "Press."

MISSING!

Anyone having information as to the whereabouts of Wesley Wedel, aged 15, 5 feet, 9 inches tall, slim, blue eyes and fair complexion, will please notify his mother, 417 Guerrero st., San Francisco. Wedel is a local radio amateur and has been missing from home for a period of three weeks.

WANTED!

CALLS HEARD BY SEVENTH
DISTRICT AMATEURS
SEND YOUR LIST TODAY!

NO TUBES SOLD

without complete instructions for operating efficiently.

**ELECTRON RELAYS and A-P
AMPLIFIERS**

personally tested on actual receiving. A new tube or your money refunded if you are not satisfied.

For prices see front cover
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B. F. McNamee

2436 Stuart St., Berkeley, Calif.

Another Grebe Triumph!

150-3000 Meters

After much experimental work, we have succeeded in adopting the Armstrong Regenerative circuit to a receiver having a wave-length range of 150-3000 meters. The result is the



Type CR-5

Regenerative Receiver



This is a complete receiver. The only additional equipment needed are phones, batteries and a detector tube. Included in its range are amateur, navy and commercial wave-lengths, special land stations, ship CW stations, navy low-wave arcs, all radio phone work and "Time." In operation, it is the last word in simplicity. Ask to see it at your dealer's today.

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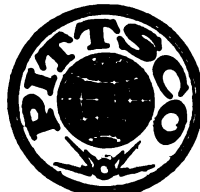
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No. UV-200 Radiotron detector.....\$5.00
No. UV-201 Radiotron amplifier..... 6.50
(These are the Radio Corp's new tubes)

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No. G-1 Amrad 1 K.W. Size.....\$41.50
No. G-2 Amrad ½ K.W. Size.....24.50
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Note—These Thordarson transformers are splendid values at above prices.

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Acme 200 Watt, mounted\$20.00
Acme 200 Watt unmounted.....16.00
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Acme 50 Watt unmounted.....12.00

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Acme 1½ Henry 500 MA double coil.\$8.00
Acme 1½ Henry 500 MA single coil 6.00
Acme 1½ Henry 150 MA double coil 6.00
Acme 1½ Henry 150 MA single coil 4.00

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Splendid material for reference and home study.

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Let us show you how our standard products can be made to solve your insulation problems.

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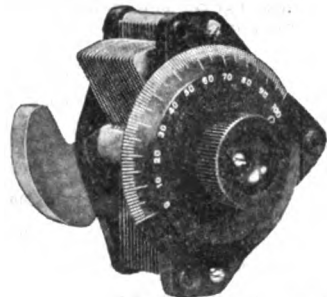
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CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No. 1—.0011 m.f. mounted	\$5.00
No. 2—.0006 m.f. mounted	4.50
No. 3—.0011 m.f. unmounted	4.75
No. 4—.0006 m.f. unmounted	4.25
Bakelite Dials only .....	.75

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET

CHELSEA, MASS.

Manufacturers of Radio Apparatus and Moulders of Bakelite

ANNOUNCING "HiCo" SERVICE

You who have tried "HiCo" service know it means prompt shipments and guaranteed satisfaction.

Formerly we confined ourselves to a very few lines, mainly our F-F Bantam Battery Booster at \$15.00. Now we are adding other well-known instruments such as Benwood Gaps, Eldridge meters, Baldwin phones, Acme apparatus, Vacuum tubes, detectors, amplifiers and transmitters, etc., etc.

Magnavox are now within reach of every amateur, price prepaid, \$45.00.

Send us your order for goods from the above lines. It will receive prompt shipment and be prepaid. Practically every order we receive is shipped within four hours.

HiCo, Box B268, MARION, ILLINOIS

"TOUGHER THAN A GOAT"

(Continued from page 290)

"I drifts up pretty close an' notices a big sign that says *Telegrafos Federales de Mexico*, an' somethin' about *no se admite*, which I figures means to keep to hell out, or somethin' similar, an' I was just decidin' I'd better not butt in, when all of a sudden what does I hear but old NAA'S big, strong five hundred cycle spark, sendin' the noon weather! I thinks to myself I must be dreamin' or crazy, because NAA's about four thousand miles from this place, an' it's broad daylight, an' I'm standin' a hundred feet from the Mexicans' station. I pulls out my watch, an' sure enough! it was just a little before ten, ship's time, which accordin' to the longitude would figure out to be around about noon by New York time.

"Well, right then, I makes up my mind I'm goin' to have a look at the Mexicans' receivin' outfit, even if I land in the caboose an' get shot for a spy at sunrise. So I drifts up to the door of the station, where I was headed off by a big, well-built Mexican with a uniform cap that says *jefe* on it. He was blacker than most Mexicans, an' his eyes was kind of wild an' dangerous lookin'. He asks me what I want in pretty slick English, an' I tells him I'd like to see his station; so he lets me in an' shows me his coal oil engines an' his dynamo an' his sendin' gear—an old kilowatt an' a half, straight-gap Telefunken, built in Germany in 1903, an' doin' good work yet.

"That was all interestin', but I was burnin' up to see that chile con carne receivin' outfit that could bring in Arlington from four thousand miles in daylight, loud enough to hear a hundred feet from the station, an' although I was lookin' everywhere, expectin' to see an eight or ten step amplifier, I couldn't spot it no place.

"Where's your receivin' gear? I asks, at last, as casual like as I could.

"Ah, *senor*, I have the most wonderful receiver on earth—a marvelous instrument of my own invention," he exclaims, unlimberin' himself with a gesture like a country rube stoppin', the mornin' milk train. He leads me into another room an' points to a rig lyin' on his operatin' desk. There was absolutely nothin' to it but a little mahogany box, about seven inches long an' four deep, an' maybe a foot long. It had a bakelite front with three little knobs an' pointers, runnin' on scales like variable condensers, an' it had four bindin' posts. Two of 'em was connected to the aerial an' ground, an' the other two was hooked up to one of them magnavox loud-speakin' horns—an' that's all there was to it. There wasn't no tunin' inductances, no audions, no nothin'.

"This controls all the tuning," the Mexican code-slinger says, takin' hold of the knob on the left-hand end of the little panel. "With this simple knob, together with the little vernier device you see underneath it, I can adjust the instrument to any wave length from twenty meters to fifty thousand meters."

"The dickens you say," I exclaims, feelin' considerably surprised.

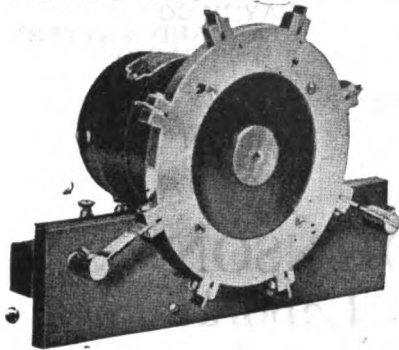
"The second knob controls a sound frequency tuner," the *jefe* goes on, takin' hold of the middle knob on the panel. "With this control I cut out every signal that has a tone frequency the least bit different from the signal I am adjusted

(Continued on page 305)



DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each......05
Renewable Stationary Electrodes, each......10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

A Word To the Wise!

The "STANDARD VT BATTERY" is made by people who specialize. They concentrate their facilities upon the manufacture of plate circuit batteries. They know how and why plate circuit batteries are used, and what is expected of them in the way of service—for which purposes an assembly of common flashlight batteries will not serve efficiently.

Dealers who sell any of the three types of the "STANDARD VT BATTERY" guarantee them fully. They know of their excellent qualities, and offer you the benefit of their knowledge and selection when they sell you the "STANDARD VT BATTERY." Still, they're not expensive. This, combined with A-1 quality, is the secret of their extensive use.

Treat yourself to a full round of satisfaction by purchasing the "STANDARD VT BATTERY" from your nearest dealer.

RICHTER-SCHOTTLE CO., MFRS.
293 CHURCH STREET NEW YORK, N. Y.

PACENT ELECTRIC CO., Sole Eastern Agents, 150 Nassau St., New York City

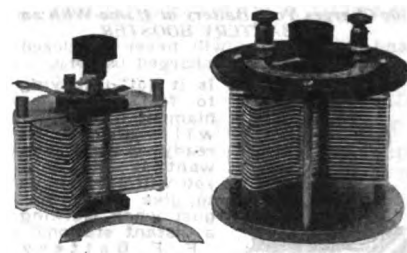


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You Save 75c.

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THE "ILLINOIS" VARIABLE CONDENSER

The Condenser with "Star Spring" Tension

MADE RIGHT - STAYS RIGHT
Hard Rolled Aluminum Plates

These condensers are made by a watch mechanic, schooled in accurate workmanship and who can't get over the habit of critical inspection.

Three Styles: No. 1, Panel; No. 2 Open Type as shown; No. 3, Fully Encased. Anti-Profitteer. Less than pre-war prices. Fully assembled and tested.

	Style No. 1	No. 2	No. 3
67 Plates	....\$7.00	\$	\$
43 "	.... 3.50	4.50	4.75
23 "	.... 2.75	3.75	4.00
13 "	.... 2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured P.P.

With Style No. 1, we will, if desired, furnish 3 inch Dial with large knob, instead of Scale and Pointer. Extra Price 75 cents.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

Kindly note: We issue no Catalog, and make no "trade discounts." We set our prices at the lowest limit, and leave the "middle man" out for the sole benefit of the "consumer."

G. F. JOHNSON

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Pacific Radio Pub. Co.
50 MAIN ST. SAN FRANCISCO

Hams—

Why not get in on the long wave stuff?

Use Radisco coils.

Here is a combination that gets fine results for everybody that uses it.

LRD 1200 for Primary
LRD 1200 for Secondary
LRD 550 for Tickler

Special introductory offer

This combination sent anywhere in the U. S., postpaid, for \$6.00. Send your order today. The coils will be shipped immediately, and you can start right in on your long range work.

Kelly and Phillips

312 Flatbush Ave., Brooklyn, N. Y.

"TOUGHER THAN A GOAT"

(Continued from page 302)

for.' With this the Mexican throws in his aerial-switch an' first adjusts the tunin' knob an' the vernier until he had brought in about forty stations, all on six hundred meters.

"You hear them all now, because the tone selector is cut out for standby work," explains the *jefe*. He throws over a little two-point switch, just over the control knob, an' right away all the signals went out except one solitary five hundred cycle spark. The *jefe* turns the knob about an eighth of an inch—bingo! out goes the high pitched spark an' in comes another guy with just a little bit lower note. Pretty soon the Mexican turns the knob a little farther, cuttin' out goes the high pitched spark an' in brings in a low-toned rotary gap.

"Holy gosh!" I ejaculates, gettin' more flabbergasted all the time. 'What's the third knob for?'

"That, *senor*," says the *jefe*, with another one of his sweepin' motions, like a swimmin' girl doin' a fancy dive, 'that is what you might call an intensity control. It is the most marvelous part of the instrument; with it I can bring in any signal as loud as I wish—no matter how far or how little be the transmitter. *Escuche!*—an' he turns the tunin' knob an' vernier until we hear POZ comin' kind of weak on the loud-speaker. That third, intensity knob has a scale marked from one to one hundred, an' the pointer is on three—the *jefe* turns it up to seven, an' say! ol' POZ comes screechin' in like one of them steam calliopes in a circus parade.

"Sufferin' smokes!" I splutters. 'I never seen anything like it!'

"That is nothing, *senor*; POZ is a very powerful station," says the *jefe*. 'Let us try two hundred meters,—he turns the tunin' knob down a ways an' sets the intensity control at thirty-five—an' a racket comes crashin' out of the loud-speaker that sounds like a Chinese orchestra celebratin' New Year. The *jefe* switches in the tone selector, an' we listens to a fellow in Chicago playin a game of checkers by 'wireless with another kid down in Joliet!'

"I was so clean stupefied, I couldn't do nothin' but just stand an' listen. Pretty soon, the *jefe* turns the tunin' knob way down close to the end of the scale, an' sets the intensity jigger at seventy-five. It kind of makes me wince when he does that—I half expects to see the loud-speaker go up through the roof in a cloud of smoke, but she hangs together, however, an' I hear a lot of queer stuff that sounds just like a bunch of bumble bees buzzin' around in a flower garden. I couldn't make head or tail out of 'em at first; an' then all of a sudden I realizes that I'm listenin' to some Canadian amateurs, hammerin' away on their fifty meter wave—on little spark coil sets! Just think of it! Hearin' spark coils on fifty meters in broad daylight, thousands of miles away! An' not a tickle of static, either!

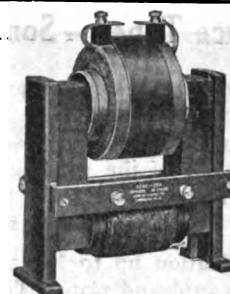
"Holy sufferin' Jerusalem!" I gasps, hardly believin' my ears. 'why in blazes haven't you took out a patent on this rig? You'd get millions for it!'

"No, *senor*, never!" exclaims the Mexican, a wild look comin' into his eyes. 'I have offered the secret of its make to Don Enrico Velasquez, in exchange for the hand of his daughter, *la Senorita Esmeralda*, who is the queen of my life and the goddess of my dreams; but fough! the proud and hard Don Enrico only kicked me like a dog, and spit on

(Continued on page 306)

ACME

TESTIMONIAL



January 30, 1921.

The Acme Apparatus Co.,
Cambridge, Mass.
Gentlemen:

I consider it a pleasure to tell you that I have succeeded in working past the four boundaries of our U. S. with one of your 1 KVA old type transformers. Really it is a wonder and it has a real "kick". My sigs heard aboard a ship 1400 miles east of New York, 2300 miles in all. 9EQ is reported QSA by several stations on the Pacific Coast, including Santa Barbara, Cal., and Vancouver, Wash. 9EQ was reported QSA at Napance, Canada, and I talked to a ship at Tela, Honduras, 1500 miles south of St. Louis.

All this work is due to you, gentlemen, and I wish to thank you and offer you my best wishes for continued success in the future. *Your ACME can't be beat!*

Yours very truly,
(Name on request)

"The Apparatus with a Guarantee."

Acme Apparatus Co. 21 Windsor St., Cambridge, 39
BOSTON, MASS.
Transformers and Radio Engineers and Manufacturers

SPECIAL OFFER

Prices Effective Until April 15th

Perfection Tubular Tron Panels and Parts.....	\$5.95
Clapp-Eastham 43-Plate Condensers, in metal cases.....	4.95
Goose-neck Bakelite VT Sockets.....	1.75
Murdock No. 367 Variable Condensers.....	3.95
Murdock No. 368 Variable (interior only).....	2.95
DeForest Honeycomb or Duo-Lateral Coils (full mounted—Sizes 25 to 500).....	20 per cent discount
DeForest D101 Galena Detector.....	1.95
DeForest CV500 Variable Condenser (complete).....	4.95
LC-100—Triple Coil Gear Mount.....	7.25
UD-101—Unit Panel Galena Detectors.....	3.45
S-200—Anti-Capacity Switch—4 pole.....	2.15
U-200—"A" Battery Switch and Telephone Jack on Standard Unit Panel.....	2.65
Amrad Induction Coil and ¼ K.W. Quenched Gap Combination, Value \$47.75; now.....	35.75

(Include postage charges when ordering)

(Send 4c in stamps for our 55 page catalog)

KARLOWA RADIO CO.

611 BEST BUILDING

ROCK ISLAND, ILL.

D. C. METERS

Three Laboratory Type Voltmeters, scale 0-100, 0-150, 0-300..	\$10.00
One Laboratory Type Ammeter, 0-100.....	10.00
Ten Combination Zero Center Voltmeters with scale lamp.	
Scale: Amps. 15 (0-30); Volts 7.5 (0-15).	
Ten Switchboard Ammeters with scale lamp. Scale 20-0-20..	8.00
Fifteen Ammeters with shunt. Scale 0-100.....	8.00
Twenty-five small Ammeters, zero center. Prices...	\$2.50 and 3.50

ETS-HOKIN & GALVAN

RADIO ENGINEERS

10 MISSION STREET

SAN FRANCISCO, CAL.

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Resonance Tuner -- Something New -- Used with Bulb Only

Built on the resonance principle of the new Coils of the U. S. Signal Service. It is a wonder tuner and is wound with pure copper strip with split phase coil inside and out of the winding. IT GETS ALL THE 200 meter stations going and the tuning is done merely with a 21 Plate Condenser in series with the aerial.



Amplification up to 100 times with variometers in series with grid and plate. This tuner will permit you to make a regular paragon at a very small price.

It is truly the wonder tuner and will revolutionize the tuner industry. These have been tested everywhere before being offered to the Amateurs and we will absolutely guarantee every one. Special price—one to each city \$6.00, add parcel post.

TRESCO, Davenport, Iowa.

Send 10c. for
16-page Catalog

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EVERY RADIO MAN NEEDS THIS BOOK.

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to "Pacific Radio News"

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PACIFIC RADIO PUBLISHING CO., San Francisco, Cal.

When writing to Advertisers please mention this Magazine

"TOUGHER THAN A GOAT"

(Continued from page 305)

me; so, soon I destroy the wonderful instrument and my secret shall go to the grave with me—*corajo!* it shall be my revenge!

"Just then, the Mexican's oil-engine, which is out in a shed back of the station, starts in to barkin' an spittin' like it was gettin' afflicted with an attack of bullsheviki, an' the *jefe* rushes out to see what's the matter with it. Soon as he was out of the room, I takes a close look at that devilish receiver, an' I notices that the top of it is hinged an' fastened with a little hook. Here's where Mr. Samuel Jones finds out what's inside of this blasted little box, I says to myself, an' I unfastens the catch. The top wouldn't come up, though; so I gets out my jack-knife an' tries to pry the darn thing loose. While I'm busy as a burglar crackin' a safe, doin' this, I hears the scrape of a chair. I swings around quick—an' there's the Mexican standin' right behind me!

"Peeg! Dog! You would steal my see-cret!" he screeches, his eyes spittin' poison an' fire like a double-barreled volcano. '*Caramba! a la muerte!*' he howls, an' he whips out a big, wicked-lookin' sheath knife. He makes a spring at me like a mad bobcat, but I dodges like a flash an' grapples with him. I manages to get a hold on his knife arm, an' we clinches for a couple of seconds. The Mexican was stronger an' heavier than me, but I matched him, anyway, by knowin' a little more about scrappin' than he did. I puts all my strength in a quick jerk an' twists the *jefe's* wrist so hard he lets out a squeal an' drops his gizzard-slicer. I kicks the knife into a corner, an' then breaks the clinch.

"The Mexican comes at me like a wild bull an' I smashes him square in the mug, but he just snarls like a mad dog an' comes back for more. I gives him another crack in the face, but he only grunts, an' punches right an' left at my ribs, an' then slips me a killin' snag under the jaw. This kind of fazes me an' I clinches. That was a bad mistake, though; the Mexican grips me like a vise an' gets a clutch on my throat like a maniac. My wind was clean shut off an' it was a case of root hog or die; so I tears my right arm loose by pure desperation an' uses it like a person can only when he's fightin' for his life. I lands about half a dozen wicked kidney blows, an' the *jefe's* grip on my wind-pipe slackens up a little. With all my might, I breaks loose from his choke-hold, an' then I fights like I never fought before an' like I never hope to fight again. I smashes my right fist into the Mexican's jaw, an' something busted. Right an' left I drives into him, but he bangs me one in the mouth that sends blood flyin' all over an' checks me a little. But I was feelin' pretty damn mad now, an' I tears into the Mexican with a string of rights an' lefts that makes his head rock, an' then I slugs him a slantin' crack on the collar-bone, an' he piles up on the floor like a sack of corn-meal.

"I was pretty dizzy, but I runs to the table, unhooks that receivin' box, puts it under my arm, an' lights out. I thinks to myself I'll be doin' the world a lot of good by savin' his wonderful invention from bein' lost just on account of a fool lovesickness, an' besides, I'll be a millionaire, ten times over, an' then maybe I can split with the *jefe* an' pacify him.

"So I goes dashin' down the road full
(Continued on page 308)



Paragon Rheostat

has become the standard filament resistance. For back of panel or table mounting. $2\frac{1}{2}$ -in diameter. 6 ohms. $1\frac{1}{2}$ amps.

\$1.75 Postpaid
Immediate shipment.

Standard VT Socket \$1.00. Why pay More?

44 Volt Variable "B" Battery, \$3.60

Include Postage on 4 Lbs.
Complete in handy wooden case and adjustable phosphor-bronze "Jiffy" connectors. Better than block batteries! If one 4.4 V. unit weakens prematurely, it can be removed and replaced, thereby not impairing the total voltage—making this the best battery value on the market.



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600 volts, 100 amps., S.P.D.T.

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3" Dial, 75c—with knob, \$1.30

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and other reliable dealers,
or sent postpaid anywhere

A. H. CORWIN & CO.

4 West Park St., Newark, N. J.

CALLS HEARD—(Continued)

CALLS HEARD BY 6EA—Addit'onal

Heard: 6ABM, 6AIL, 6CZ, 6EM, 6HH, 6HP, 6KM, (PX-c.w.), 6RA, 6SV, (VL, 6WZ, 7BJ, 7BR, 7ZK, KDEH, NRRS-c.w., and "R.M.")

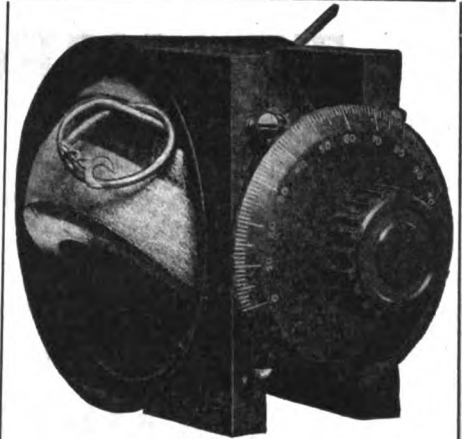
Worked: 6AAT, 6ACM, 6AGF, 6AH-c.w., 6CH, 6JJ, 6TV, 6ZM, 7BP, 7DS, 7IN and "SC"-c.w. Station 6EA worked 7DA, 7IN, 7ZI and 7ZJ on low power used for local work (139.5 watts as tested by a watt-meter as used by the Southern California Edison Company.) Radiation on a Westinghouse thermocoupled meter in 2 amps. Station 6EA was reported heard by 9MS at Davenport, Iowa on February 21st.

CALLS HEARD AT 7HE, KALAMA, WASHINGTON

5ZA, 6AD, 6AF, 6AH, 6AK, 6AN, 6AT, 6BJ, 6CV, 6DP, 6EA, 6EJ, 6FE, 6FG, 6FS, 6GF, 6GR, 6HF, 6IC, 6IN, 6JD, 6JR, 6KM, 6LK, 6MK, 6MN, 6NH, 6OH, 6PR, 6QM, 6RE, 6TA, 6TC, 6TU, 6ZF, 6ZK, 6ZM, 6ZR, 6ZU, 6AAT, 6AAW, 6ACM, 6AFY, 6AGT, 7AD, 7AE, 7AI, 7BC, 7BG, 7BH, 7BJ, 7BK, (7BP), 7BQ, (7BR), 7BS, (7BV), 7CA, 7CC, 7CE, 7CH, (7CU), 7CW, (7DA), 7DK, 7ED, 7EJ, 7FG, 7FH, 7FK, 7GA, 7GF, 7GI, 7GM, 7GQ, 7GS, 7GY, 7HN, 7IM, 7IN, 7IV, 7JF, (7JG), 7JM, 7JP, 7JR, 7JX, 7KB, 7KM, 7KV, 7LR, 7LW, 7YA, 7YG sparks and phones, 7YS, 7ZD, 7ZI, (7ZJ), (7ZK), 9LR.

Anyone hearing 7HE please write.

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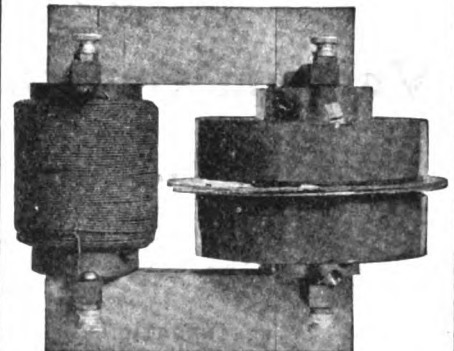


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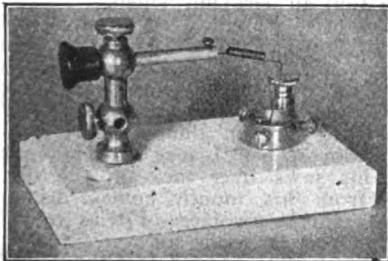
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PRICE \$2.00

Postpaid in the U. S.

Efficient Radio Apparatus Shop

BOX 662

DAYTON, OHIO

"TOUGHER THAN A GOAT"

(Continued from page 306)

speed, but before I gets anywhere I runs into worse trouble. Somebody's opened the gate to that there snake ranch, an' here's that big, ugly boa right out in the road waitin' for me. I comes to a halt darn pronto, but before I got time to think what to do now, I sees that the snake is navigatin' in my direction.

"Well, believe me, I just turns right around an' breezes back up the road about thirty times faster'n I came down it—an' that blasted snake comes lickety split after me. I gets into the middle of town in about thirteen seconds, but all the buildin's bein' barred an' ironed up, there's no place I can get into, unless I go back to the Mexican wireless station. I sure hates to do that, but that damn snake is comin' on like an old clipper with every rag set an' a stiff breeze on the quarter; so there's nothin' for me to do but scoot back to the jefe's hangout.

"I comes dashin' madly in, drops the receivin' infernity on the floor, an' starts to slam the door shut, when bingo! somethin' cracks me over the bean an' makes me see about three million stars shootin' in every direction. I sinks down onto my knees, an' sees the jefe standin' over me. His face is all battered up an' bloody, but he's pretty well awake now, an' he's got a gunny-sack with a few pounds of iron nuts an' bolts in it. He lands me another skull-mashin' crack with that sack of ironware, an' I lies down on the boor.

"Then the door busts open an' that big, hideous snake comes slidin' into the room. He gets about half of himself inside an' then the place is full up with him. The big coils of his body are all around me, an' I sees that his under part is a dirty white color with big, hard, smooth scales, the size of meat-platters, while his top side is black an' sweaty, an' full of dull gray blotches. His eyes is big as port-holes, but they are squinty-shaped, like diamonds, an' cold like glass or steel. A nesty gluish slime is drippin' out of his mouth, an' he had a foul an' sickenin' smell.

"Corajo! I will feed you to the culcra!" howls the Mexican, who seems to know the snake. Again an' again he cracks me in the head with his sack of scrap-iron, until my skull feels like it's smashed to jelly, an' things begins to get pretty dim. Then I sees the big snake open his jaws over me, an' the dirty slime from his mouth comes drippin' down, right in my face. I tries to yell, but I'm too far gone an' can't make a sound—not even when I feel the snake's hot, slimy jaws closin' around me. Talk about a horrible sensation—that was one! School is out an' the dance is done now, all right, I thinks to myself, an' I closes my eyes—an' then, all of a sudden everything whirls like a merry-go-round, an' I seems to be runnin' an' jumpin' an' flyin' an' standin' on my head all at the same time, till I feel about like a dish of scrambled eggs—an' then, the next thing I know, the Mexican wireless station has turned into my own shack on the 'Selville,' an' the snake has withered up until he is nothin' but my transmitter aerial-inductance hangin' on the ceilin'. An' then I realizes I'm lyin' on my own leather couch, an' the Mexican with the sack of scrap-iron is the ship's steward, who's standin' over me an' slaappin' me in the face with a towel soakin' with ice-water. That alcohol bottle is still standin' on my desk, an' it's bone dry.

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"Some kick to that grain alco of yours," I says, tryin' to set up, an' failin' in the attempt.

"Well, there wasn't any grain alcohol about it but the label, you damned chump!" snaps the steward, moppin' the sweat off'n his own face with the cold towel. "That was just an old bottle that I've been dumping all kinds of leavin's into for the last three years. It was a mixture of wood alcohol an' carbon disulphine an' witch hazel an' ether an' the Lord only knows what else! Why, a spoonful of it would kill a goat!"

"Well, I reckon I'm tougher'n a goat, then," I says, beginnin' to feel kind of proud of myself, even if I was sicker'n a poisoned cur-dog, because there was nearly a quart of the blasted stuff, an' the arc never got more'n half a pint of it."

(The End.)

HIGH SCHOOL RADIO CLUB DECLARED TO BE UNIQUE

The newly formed Radio Club at the San Diego high school is declared to be unique in that no similar organization will give the embryo scientists an opportunity to learn wireless telegraphy and allied subjects.

Edward Kinney got permission from Principal H. O. Wise and the executive committee of the high school to form the organization. The first meeting, for the election of officers, was held.

Those who will make up the Radio Club are: Edward Kinney, Burton McKim, True Robinson, William Wright, Hugh Compton, Homer Hostetter, William Clark, Richard Ball, Gardner Hart, L. Stewart, Raymond Jacob, Thomas Kelly, George Hulstede, William Copeland, Morrison Ball, Harry Sortais, Lester Picker, Robert Hill, Sanford Griffin, Richard Cox, Haley Iams, William Beran, Dudley Chambers, Hugh Young, Robert Rogers and Ralph Rogers.—San Diego "Union."

"Elements of Radio Telegraph"—a good book on various radio subjects. Lieut. E. W. Stone is the author. Many good photographs and diagrams. \$2.50 per copy, postpaid. For sale by Pacific Radio Publishing Company, San Francisco.—Advt.

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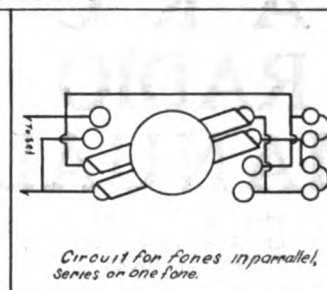
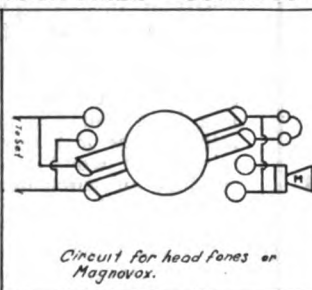
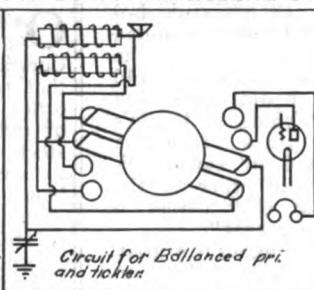
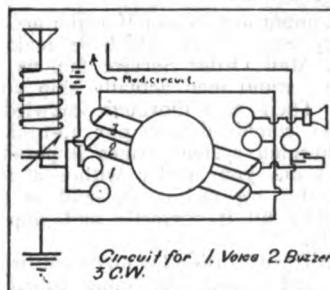
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RADIO TELEPHONE CONTEST

The prize this month was a Pen Brand one-step amplifier unit, and was awarded to Mr. Carroll Kennedy of Kelso, Wash. (7BY), who picked up the necessary one item of press sent by voice and C. W. and mailed us the report by postal before noon the following day.

In this contest, for those who do not know of it, we are offering a prize each month to the amateur hearing the press sent out by voice and C. W. The one hearing the press at the greatest distance will be awarded the prize.

RULES OF CONTEST—The amateurs hearing our press must send us word by mail, giving an item of the press we have transmitted.

Contestants must mail all letters before noon of the following day. We reserve the right to accept or reject any contestants.

Schedules: Tuesdays and Fridays at 8:00 p. m.
Wave length, 200 meters. Press by voice 8:00 p. m.
Call letters, 6UV. Press by C. W. 8:20 p. m.
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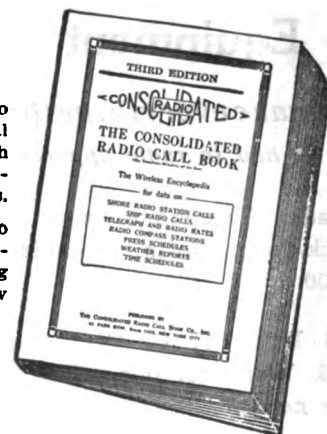
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The dealer's demand for "Radio Topics" was so great that our supply is exhausted.

The March issue contains articles by Dr. Lee De Forest, Harvey M. Anthony and other well-known radio authorities.

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JAPANESE RADIO OPERATORS ACCUSED OF "HOGGING AIR"

JAPANESE radio operators have been "hogging the air" and preventing the sending of wireless messages, according to the complaint of the Radio Operators' Association which will formally file a protest with Federal Radio Inspector Dillon.

Claims are made that the Japanese operators, by continuous use of their keys, have effectively prevented American and other ships from communication with other vessels and shore stations.

Specific complaints are made against the *Siberia Maru* of the T. K. K. line that its operator spent several hours in private wirefessing for a distinguished Japanese aboard, preventing an American steamer with a disabled rudder from calling for help. Similar complaint was made in the case of the Dutch steamer "Arakan", which recently went ashore at Point Reyes.—S. F. "Call."

PROBABLY the only municipal-owned radio station handling ship business in the United States is KPE on Pier 1 in the port warden's office of the Harbor Department of the City of Seattle.

Service was first inaugurated May 14, 1915, with a small set of no special manufacture. An eight-hour watch was maintained during the daylight hours and its value to the department and the shipping interests proved to be so great that after the armistice was signed KPE was equipped with a two Kilowatt Kilbourne and Clark mercury bulb transmitter and a continuous watch maintained.

On August 16, 1917, during the early war days, the naval authorities removed the apparatus at KPE to the Naval Training School on the campus of the University of Washington.

Together with the radio service, a log is kept of all movements of ships in the harbor, such as arrivals, departures and shiftings, whereby ship owners and operators are constantly advised as to the positions of their vessels.

All ship business sent to or from the pier station is handled free of charge.

The Harbor Department is the nucleus for all the shipping information on Puget Sound, as it has every facility for the purpose and its usefulness is becoming more pronounced from the meritorious service this department allows the shipping interests.

The Pacific Coast chain of arc stations for the Federal Telegraph Company will be in operation within three months.

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WITHIN the course of a few weeks vessels entering Puget Sound by way of the Straits of Juan de Fuca will be able to navigate with the assistance of radio compass stations, according to advices reaching local shipping circles from the North.

The report further indicates that a series of compass stations have been erected by the Navy Department from Cape Flattery to the vicinity of Port Townsend, and that these stations will be in operation soon at the entrances to the Columbia River, Grays Harbor and Willapa Harbor.

Cape Flattery will be marked by a station at Tatoosh Island, west and south of the cape, while another station will be located at New Dungeness, a long split projecting into the strait between Port Townsend and Port Angeles. Cattle Point, the south end of San Juan Island and across the strait from New Dungeness, is the site of another station, while another station is located between these two on Smith Island.—San Francisco "Journal."

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A news item of importance to trade and commerce as well as shipping was conveyed to Seattle on the steamer Empress of Asia which put into that port from the Orient recently. The news embodied the fact that the British Chamber of Commerce at Hongkong has succeeded in securing a promise from the British government to erect a powerful wireless station at Hongkong for the purpose of communicating with India. Honolulu and other places where stations have already been established.—San Francisco "Journal."

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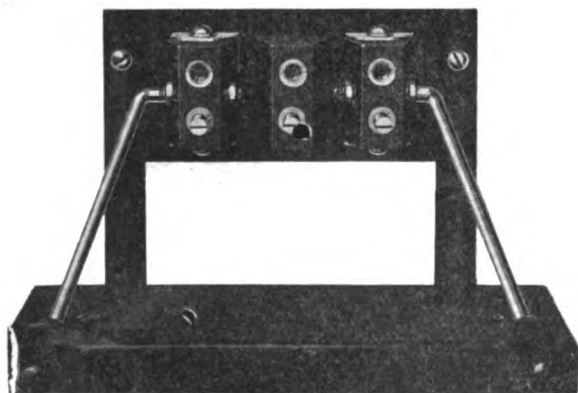
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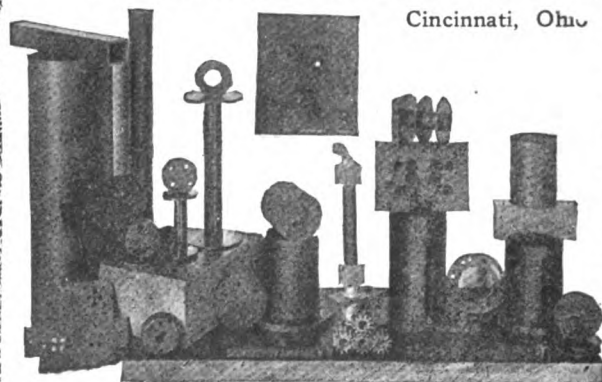
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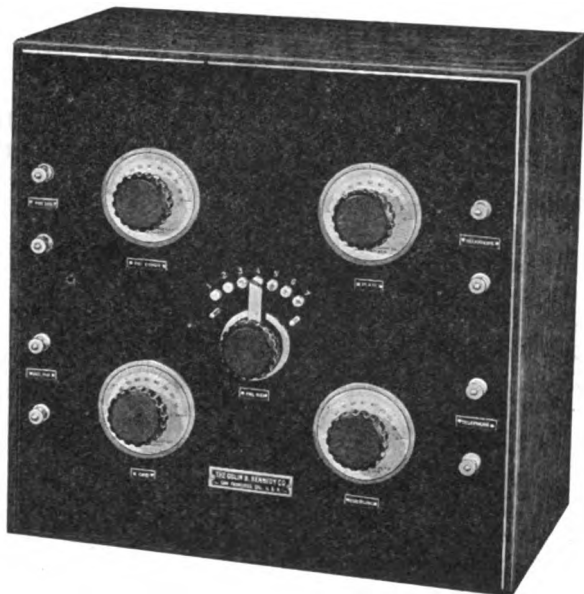
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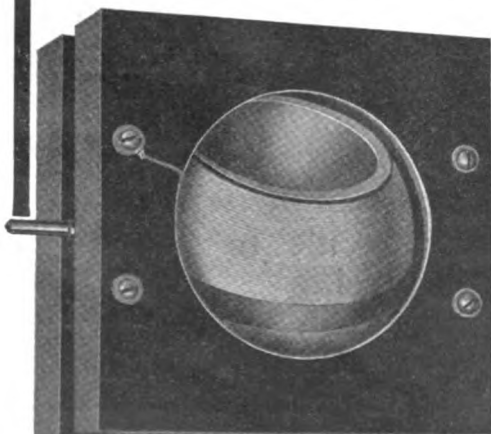
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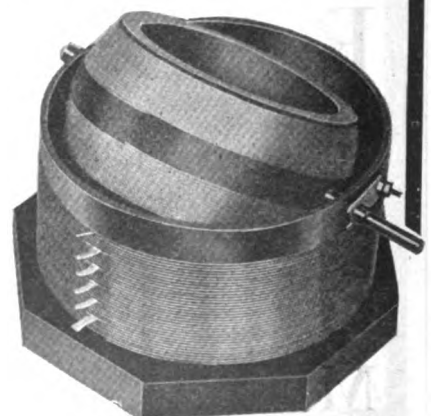


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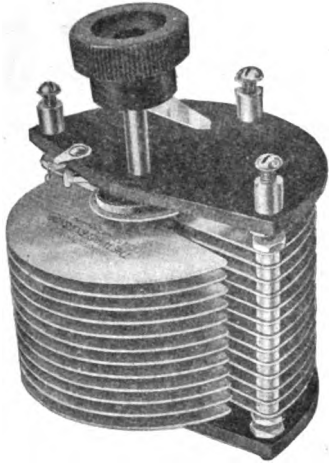
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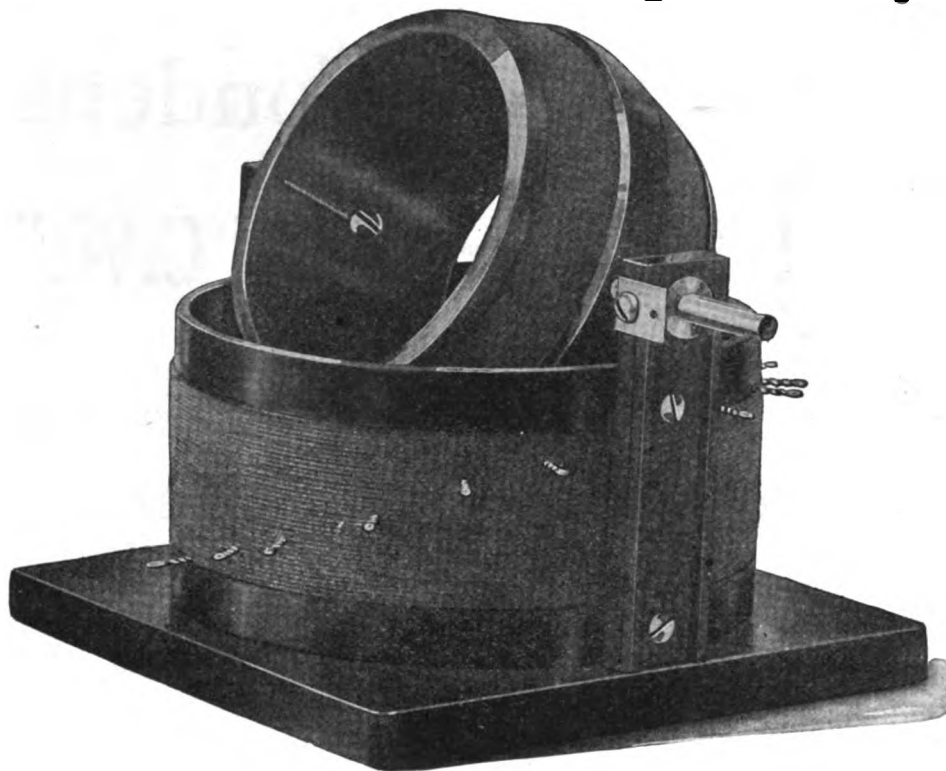
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Radio Electric Co.
3807 Fifth Ave.

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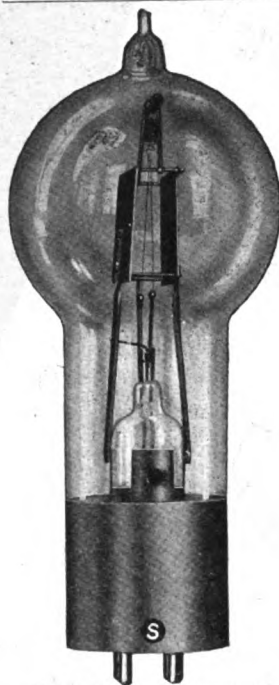
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PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

A=P leads again

NEW A-P RECTIFIER TUBE FOR EXPERIMENTAL CW



Price \$9.75. Diagram of connections furnished free with each tube.

Come on, you CW enthusiasts! It's for you—a brand new rectifier tube for your experimental CW, which **makes the expensive high voltage DC generator unnecessary.** Simply step up your 110 V. A C lighting supply with a small transformer to 350, 500, or 750 volts, and two of the new tubes do the rest, rectifying both halves of the cycle so the plates of your transmitting tubes get all the high potential direct current necessary—without the use of a high voltage generator.

The A-P Rectifier has a 75 milliamperes carrying capacity, which is sufficient to operate five A-P Transmitting Tubes in parallel. For high power CW transmission, use additional **A-P Rectifier Tubes** in parallel.

A-P Rectifiers used in Type O A-C DeForest Radiophones are equipped with the SHAW standard condensite four-prong base, and licensed under SHAW patents. **Price \$9.75.** Order from your dealer or direct from addresses below.

DIAGRAM OF CONNECTIONS FREE WITH EACH TUBE

And for the best book on Radio, ask your dealer for "Elements of Radiotelegraphy," by Lieut. E. W. Stone, U. S. N.; or order direct from—

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The New **A-P RECTIFIER TUBE**

CUNNINGHAM

DETECTOR TUBE

Type C-300

**General Electric Quality
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TYPE C300 invites comparison. Amateur requirements decided its design. Many years research of vacuum tube properties have made Type C300 the Ideal Amateur Receiving Tube. Detector sensitivity at low plate voltages requires that gas action be combined with the electron emission and by a wonderful new process of manufacture this gas action is so controlled that the plate voltage for maximum signal audibility is always within the limits 18—22½ volts. This tube is one of the latest products of the great Research Laboratory of the General Electric Company. Only a single block cell is needed in the plate circuit—a big saving in battery investment. Type C300 is completely silent in operation—a decided advantage in receiving weak signals.

Any three member vacuum tube is necessarily an amplifier, but the results obtained from Type C300 as a tone frequency amplifier with only 22½ volt plate battery proved a surprise. Again Type C300 invites comparison. Competitive tests show this tube to excel any tone frequency amplifier previously developed. For power amplification in operating loud speaking telephones and in complex and multi-stage circuits use the special Pilotron amplifier Type C301 for freedom from distortion. Write for special Bulletin C301.

Type C300 is a free and persistent oscillator for regenerative amplification and C. W. reception.

The pleasure and

**Type C-300
\$5.00**

satisfaction from operating Type C300 cannot be described. See your dealer today—or write for his name and a copy of Bulletin C300.

Dealers: Standard Packages F.O.B.
Cleveland, San Francisco,
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E. J. Cunningham

Trading as

AUDIOTRON MFG. COMPANY
35 Montgomery Street
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RADIOTRONS

"A TUBE FOR EVERY NEED"

Radiotrons are now recognized as the amateur's and experimenter's standard for Radio detection, amplification and power work. They are available at established Radio dealers throughout the United States.

Scientifically designed and manufactured in the country's largest lamp factories, Radiotrons come to the experimenter with uniform and dependable characteristics.

One of the following tubes is certain to meet your requirements

U. V. 200
DETECTOR
\$5.00

U. V. 201
AMPLIFIER
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U. V. 202
POWER TUBE
5-Watt
\$8.00

U. V. 203
POWER TUBE
50-Watt
\$30.00

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POWER TUBE
250-Watt
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The Radio Corporation's tubes are covered by patents dated November 7th, 1905, January 15th, 1907, and February 18th, 1908, as well as by other patents issued and pending. Tubes licensed for amateur and experimental use only. Any other use will constitute an infringement.

Your dealer has Illustrated Bulletins on Radiotrons,
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SUITE 1804

RADIO CORPORATION OF AMERICA
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NEW YORK CITY

- Here's your power plant -



Number 774

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Number 766

The EVEREADY is everywhere known as the battery of ENDURANCE. It stays on the job for a long, long time. All the skill and experience of the EVEREADY engineers are sealed up in this battery.

Once you know the power and endurance of the EVEREADY wireless "B" battery, you will never be satisfied with anything less. These batteries are sold by dealers everywhere.

NATIONAL CARBON CO., Inc.

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In spite of the fact that the Radio Magnavox when used with a suitable amplifier, will give forth stronger signals than any known receiver, it is, by reason of its patented electrodynamic design, extremely sensitive to weak signals also. And remember that full field strength is not necessary for the average signal. Less than one ampere through the field will be sufficient for all but the very weakest, or when extreme volume is necessary.

Price **\$45** At Your Dealers

If you are building a Radiophone be sure and use Magnavox Transmitter microphones—They will give you Maximum Modulation.

THE MAGNAVOX CO.

Oakland, Calif.

CONTINENTAL NEWS

MAY, 1921

Published Every Month In Pacific Radio News By Continental Radio and Electric Corporation

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Send your next order to Continental. "Where the promise is performed." Please make remittance by P. O. Money Order or Bank Draft, to avoid any delay.

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Radio Craft	\$6.00
Nightingale (small)	4.50
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Grebe	8.50
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Clapp-Eastham	5.75

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No. A-2 Acme, mounted	\$7.00
No. A-2 Acme, unmounted	5.00
No. A-2 Acme, unmounted	4.50
No. 226-W Federal	7.50

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No. 7623 Standard, 22.5 V small	\$1.50
No. 7625 Standard, 22.5 V large	2.85
No. 7650 Standard, 22.5 V variable	3.50
No. 766 Eveready, 22.5 V large	3.50
No. 763 Eveready, 22.5 V small	2.25
No. 703 Eveready, flashlight cells, set of 10, 45 V	3.50

Audion Control Panels

No. RORA Grebe, in Cabinet	\$12.50
No. RORH Grebe, with tickler connections	17.00
No. ZRD Clapp-Eastham (new type)	12.00
No. Y-1 Acme (latest model)	10.00
No. P-500 DeForest, audion ultra-audion type with 45 "B" battery	24.00
Adams-Morgan "Paragon" special, just out	6.00
Al-10 Radio-Craft	15.00

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No. A-1 Arnold, 3500 meters	\$22.00
No. Y-673 Clapp-Eastham, 3000 meters	14.00
No. 344 Murdock, 1500 meters	9.00

Storage Batteries

10001 4 V 60 Amperes Battery	\$14.50
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All batteries are shipped fully charged.	

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No. 1427 W, S P S T 4 springs	2.60

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1421 W Open Circuit Jack	.70
1422 W Closed Circuit Jack	.86
1423 W Two Circuit Jack	1.00
1428 W Plug	2.00
Special Creco Plug	1.50

The Continental 112-page catalogue contains complete listings of all radio apparatus, including a comprehensive line of C. W. equipment. Mailed anywhere in the world for 25 cents. Send for your copy today.

PARAGON RECEIVERS MAKE GOOD IN USER'S OWN TESTS



Licensed under Armstrong and Marconi Patents.

View of Paragon R. A. Ten Amplifying Short Wave Regenerative Receiver—identical with the sets used in these tests.

Prominent amateurs endorse Paragons after careful tests and comparisons. "Comes up to all advertised requirements," says Y. M. C. A. Radio School.

A great number of genuine Paragon R. A. Ten Regenerative Receiving Sets are now in actual use, more than fulfilling every advertised superiority.

Mr. J. L. Hornung of the Department of Education, East Side Y. M. C. A., writes: Gentlemen:

We are in receipt of your Paragon R. A. Ten Regenerative Receiver and wish to extend a few words of appreciation.

The receiver has been given a due trial, in which comparative tests have been made with the best types of regenerative receivers now on the market. We find that it comes up to all of the specified requirements made in your advertisements without any contradictions whatsoever!

Very truly yours,
Y. M. C. A. Radio School.
By J. L. Hornung.

"Heard Stations Never Heard Before"

A recent advertisement for Paragons carried the headline, "You'll hear stations you never heard before." In this connection, this letter from J. Edw. Brown is interesting.

Glenbrook, Conn.

Gentlemen: I thought it may be of interest to you to know about the Paragon R. A. Ten Receiver just installed a short time ago. I hooked this up on the evening of Jan 8. The first thing picked up was Wisconsin. From that time on we heard stations that had never been heard before in this section.

I picked up the steamer Gloucester (KQG) off Barnegat, talking to Asbury Park on detector alone, as the first stage ampli-

Outstanding features of the Genuine

PARAGON R. A. TEN

(Registered U. S. Patent Office)

Amplifying Short Wave Receiver

Wave length, 160 to 1,000 meters.

Amplification 100 times.

No dead end losses whatever. Vernier attachments on all controls.

Coupling has scale of 1800. Free from all body capacity effects.

Guaranteed for two years.

"The weaker the signal, the stronger the amplification." Price, eighty-five dollars.

Another surprise was that the instrument seems to be protected, as I failed to get any body capacity whatever!

This is the best by far that I have ever heard—especially for strength of signals on detector alone.

I congratulate you on having such a wonderful machine—and at the price of \$85.00—for at this amount it places the instrument within the reach of most amateurs.

Very truly,

J. Edw. Brown.

Another amateur with a similar experience writes:

Bayshore, New York.

Gentlemen:

I have recently had the pleasure of trying out one of your Paragon R. A. TENS, and I am taking this time to congratulate you upon the design and con-

struction of the tuner that, in my opinion, is the best thing that ever was placed on the market. Stations that, before the R. A.'s installation were QRZ, or not heard at all, pounded in as though a two step had been added to the set; and the tuning was much sharper than I had hitherto ever experienced.

There are two points that are especially to be commended: The ability to tune down to 150 meters with no loss of amplification, and the insensitiveness of the tuner to external capacity effects. These two points render it entirely possible to handle traffic by long jumps under the jam of 200 and up. I trust that you may be interested in the results as enumerated, and in the points of superiority, over other tuners, that struck me forcibly.

Very truly yours,
2BGR
Tremaine House.

The letters quoted here, as well as many others of similar nature, are on file at our office. Such whole-hearted endorsement from experienced operators should guide you in your radio work. A Paragon Receiver may cost Eighty-five Dollars, to be sure—but, a genuine Paragon is nevertheless the best "buy," per dollar, on the market. Remember, also, the guarantee is for Two Years. The instrument is built to long outlast the guarantee.

Order a Paragon R. A. Ten, or get our descriptive booklet by using the coupon below.

Continental Radio and Electric Corp., Dept. G74, 6 Warren St., New York.

☐ Enclosed find remittance for Eighty-five Dollars. Ship me at once one Paragon R. A. Ten.

☐ Send me your free illustrated booklet, containing complete description of the Paragon R. A. Ten.

Name

Address

City

State

CONTINENTAL

RADIO AND ELECTRIC CORP.

J. Di BLASI, Sec.
Dept. G74

6 Warren St.

J. STANTLEY, Treas.
New York

GET MUSICAL SIGNALS---NOT MUSICAL TUBES

RADIOTRONS

The Noiseless Tubes



"They don't sing"

RADIOTRONS are manufactured by the General Electric Company in accordance with rigid specifications. Long life and unequalled performance are foremost factors.

RADIOTRON UV, 200 is not only the best detector and "Spark receptor" designed to date, but it is also an excellent tone frequency amplifier for magnification of the telephone currents in vacuum tube receiving circuits. Filament operates on 6-volt source at 1.1 amperes. Plate circuit requires from 18 to 22½ volts. Price **\$.00**

RADIOTRON UV, 201. An amplifying tube of rigid operating characteristics. UV 201 is a vacuum tube amplifier which will magnify the telephone currents in a radio receiving set and which can be shifted from one socket to another in a cascade outfit without loss of signal audibility. Filament operates on 6-volt source at 1.1. Plate circuit designed for connection to 40 to 100 volt source. Price..... **\$6.50**

RADIOTRON UV, 202. A power tube rated at 5 watt output. Filament current 7.5 volts at 2.35 amperes. Normal plate potential 350. Price **\$8.00**

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AN IDEAL COMBINATION

THE PEN BRAND DETECTOR and Radiotron Tube

A Detector Panel designed for the Radiotron tube. The condenser is the RIGHT capacity which insures maximum signal strength. All bakelite socket, Panel rheostat, etc. Neat in appearance, efficient in operation. **\$6.50**



The Amplifier That Amplifies

The Amplifier unit to match detector is the same in dimensions and appearance, Acme amplifying transformer used, of course. Price **\$13.25**

The Pen Brand Single Stage Amplifier

Pen Brand Fan Switch



For those desiring to use a fixed step condenser. Ideal for CW sets or step bridging condenser. Price \$1.00.

Pen Brand Series Parallel Switch

An absolute necessity in an experimental station. For changing the position of condensers, from series to parallel changing coils, switching from loud speaker to receivers, from one to two pairs of receivers, etc. Absolutely necessary with honey comb coils. PRICE, \$1.25.



Pen Brand Grid Condenser

One amateur writes: "The Pen Brand Condenser I bought from you works great. Why should a fellow pay \$4.00 for a variable condenser when you can get a Pen Brand for \$1.00 which works a 100 times better."

Another amateur in Milton, Iowa, says: "It is by far the best grid condenser I have ever used, and I have had many. The neat construction is another good advantage over all others. It is well worth the price you ask, and I am entirely satisfied with it."

METERS

0-100 M. A. Weston.....\$8.50
0-300 M. A. Radio Telephone Shop.....\$8.50
0-500 M. A. Radio Telephone Shop.....\$8.50
0-500 D. C. Voltmeter.....\$15.00
All meters are 3-inch flush type.



HE NOW HAS TWO PEN BRAND GRID CONDENSERS

From Corsecana, Texas—"I am highly pleased with this one. I put it in VT control cabinet made for and used on Paragon R. A. Ten and very promptly picked up the radio-fone on Catalina Island. The voices very clear and easily understood on one VT. This shows that this Grid condenser is just the right capacity and am well pleased with it."

Our money-back proposition gives you a chance to compare a Pen Brand Grid Condenser with the one you are using. PRICE, \$1.00.

Dealers: The rapidly increasing demand for PEN BRAND products will necessitate your stocking of our equipment. Write for our proposition today.

The Radio Telephone Shop—"6UV"
175 Steuart Street

San Francisco



PAUL R. FENNER
Editor
L. MOTT
Assoc. Editor
H. W. DICKOW
Advertising Manager
50 Main St., S. F., Cal.
June Issue Forms
close on May 1



PACIFIC RADIO NEWS

RADIOTORIAL

BY THE EDITOR



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THE NEW RADIO LICENSES

FOR the first time in the history of Radio communication a more than ordinary distinction between the various classes of Radio men in the commercial field is to be made.

At the present time there are only two classes of professional operators—first and second grade. There is a third grade that is hardly worth mentioning.

Several months ago, representatives of the various radio service companies, steamship owners and officers of the United Radio Telegraphers' Association conferred with Secretary Alexander and Commissioner Chamberlain for the purpose of establishing a new system of radio licenses for commercial operators. An acceptable system was inaugurated. It becomes effective on July 1, 1921. The speed minimum has been increased from 20 words a minute to 25 words a minute. This new ruling is indeed welcomed by all commercial and government radio men, and particularly by the shore station operators who have been handling traffic with vessels at sea. The average ship operator is hardly capable of transacting his business consistently at a speed of more than 20 words a minute.

The Radio Convention of 1912 provided for a first and second class license. Under the new ruling, licenses issued by the Department of Commerce will be graded according to the length of

Announcements

IT gives us much pleasure to announce that United States Deputy Game Warden Mr. Lawrence Mott of New York City and Avalon, Catalina Island, California, has joined the staff of "Pacific Radio News," as Associate Editor. By profession Mr. Mott is a well known author, his first book having been published by the Century Company of New York, while he was still in Harvard, from which seat of learning he graduated in '05. Since that time Mr. Mott has traveled up and down and round-about the world in search of sport—big game shooting, fishing—and gathering material for his many books and short stories. He was staff correspondent for the New York "Sun" in the Far East during a period of the war, and, for various services rendered has been decorated by foreign governments.

Warden Mott has ever been a radio enthusiast. He is a firm believer in marvels STILL to be achieved, and is continually experimenting at his up-to-the-minute station on Catalina Island. He confines himself exclusively to CW work, being convinced that along these lines lies the REAL future of radio effort. Our new Associate Editor will, from time to time, give us editorials, and articles that will be found pertinent to matters in which we are all interested.

service of the holder of a license. A successful applicant for a commercial license will first receive a third grade, second class license. He will not receive his first grade license until his

commercial radio service warrants the issuance of same.

It will be impossible in the future for an inexperienced operator to obtain a commercial first grade license. His experience will be clearly shown by the grade of license that he holds. Operators have often been placed in charge of the radio equipment aboard ship without any previous experience whatsoever. As a war-time measure such misplacement was unavoidable but it should not be tolerated when the supply of commercial operators far exceed the demand. The standing of the professional operator has been lowered considerably by such action on the part of the various commercial companies.

Salaries paid to ship operators several years ago were as low as \$35.00 a month. The present day ship operator receives from \$85.00 to \$125.00 a month with a substantial allowance for port pay. A beginner in commercial radio is not entitled to such salaries and the new license system will keep many from entering the commercial field. It is generally understood that salaries will be paid according to the grade of license held. If this system is placed into effect, the professional old-time operator should receive an increase in salary.

In this manner, chance will be a very small factor. Advancement and salary increases will be the reward of the deserving.

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1306 Hartford Bldg.

Seattle Office.....419 Pioneer Bldg.
London Office....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

EDITOR'S NOTE

Mr. A. K. Aster has written four articles for "Pacific Radio News", the first of which appears herewith. Each article will be in the form of a complete chapter.

Chapter 2 deals with Voltage Amplifiers; Chapter 3 deals with Power Amplifiers; Chapter 4 describes the new system of tape reception using a vacuum tube.

THE AUDION AMPLIFIER

By A. K. ASTER

Instructor, Department of Physics, University of California

THE important part which relay and long distance work is playing in the amateur field today makes it necessary for the amateur to thoroughly understand audion amplifiers if he desires to be up to date. From personal observation, it is evident to me that amplifiers are very little understood. In this and a series of articles which are to follow it, I will make an attempt to explain the action of the audion as an amplifier and then discuss the various types of amplifiers suitable for radio telegraphic and telephonic work.

In 1884 Edison was apparently examining the phenomena involved when carbon filament lamps are run at high efficiency. He discovered that if he placed

In 1907 Lee de Forest inserted a grid between the filament and plate and found that he thereby could control the current flowing from the plate to filament. He called this new device the "Audion."

The action of the thermionic valve as the audion is commonly called today is as follows: Referring to Fig. 1, first assume the case where there is no grid in the tube at all. As soon as key (k) is closed the battery (b) charges the plate positively and attracts to it the negative electrons which are being shot off from the hot filament, this causes a current to flow in the direction indicated by the arrows on the diagram. This current is commonly referred to as the plate current. Now as-

sumptive plate and hence increase the plate current slightly, the amount depending on the grid and plate potentials.

3. Assume the grid to be controlled to the mid-point of a resistance connected directly across the filament (not shown in the diagram). The grid will now be at zero potential with respect to the filament.

It will therefore neither attract or repel electrons shot off from the filament. In their course from the filament to the plate a few electrons will strike the grid and charge it negatively. This charge will be conducted away to the filament and the grid will remain at zero potential with respect to the filament. The result is that the tube will

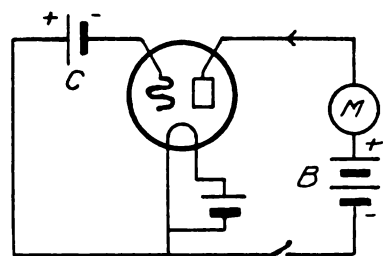


Fig. 1

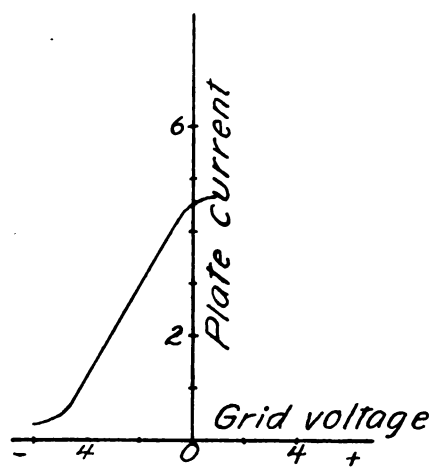


Fig. 2

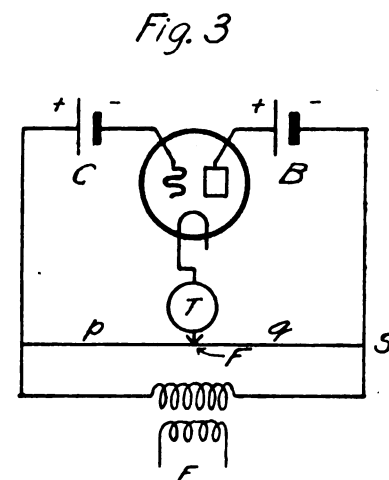


Fig. 3

a metal plate between the legs of a horseshoe-shaped filament in a carbon filament lamp and connected a wire from the plate through a galvanometer to the positive side of the filament (the filament being heated by a direct current) that the galvanometer indicated a few milliamperes when the filament was glowing. He observed that when the plate was connected to the negative side of the filament little or no current flowed. This was the first important discovery which led to the present audion. The phenomena he discovered is known as the "Edison Effect."

In 1904 Fleming made use of this phenomena in his so-called "Fleming Valve" for the detection of radio signals. This device is too well known to need further description here. Those who are not familiar with it will find it described in any good book on Wireless Telegraphy.

sume a grid to be placed between the plate and filament. Here we will consider four cases.

1. Assume the grid to be entirely insulated from the plate and filament. Some of the negative electrons shot off from the filament and attracted to the plate will strike the grid and charge it negatively. This charging will continue (assuming no leakage) until the grid is charged so highly negative as to repel practically all the negative electrons shot off from the filament and hence practically stop the plate current.

2. Assume the grid to be connected to the positive side of the filament. The grid will now act as a second plate and because of its positive charge attract to it some of the electrons from the filament, and as will be expected, a small grid current will flow. Some of the electrons attracted to the grid will miss it and go on to the more posi-

act as though there were no grid in it at all.

4. Assume the grid connected to the negative side of the filament. The grid will now be charged negatively, the amount depending on the tube, filament, battery, etc. It will then act as a partial barrier to the electrons flowing from the filament to the plate and a complete one if the grid is charged negative to a sufficient degree. This does not occur in practice unless a sufficiently large negative grid battery is put in the circuit.

From the above statements it is obvious that the grid acts as a controlling device for the stream of electrons flowing from the filament to the plate. Let us now examine this phenomena a little further. Take a circuit such as Fig. 1 and place a milliammeter in the plate circuit and provide some means in the grid circuit for varying the potential from

say (—50) to (+50) volts and put 100 volts in the plate circuit. Now leave the plate voltage and plot the values of the plate current for the various values of grid voltage. The result will be that of a curve of the form of Fig. 2. It will be observed that if we keep on the straight portion of the curve, a given change in grid voltage will produce a large change in plate current, hence a large change in voltage across the plate load assuming the resistance of the plate circuit to remain constant. This is the amplifying action of audion and the property which makes it suitable for amplifying radio, telephone and other currents. The ratio of a resulting change in plate load voltage to a given change in grid voltage is the so-called voltage amplification constant of a tube. This varies from 5 to 40 in practice although tubes having a factor as high as 200 have been built but they are not stable in operation. This factor is nearly constant over the usable range of the tube as is for the most part dependent

on the structural dimensions of the tube although somewhat dependent on the voltage and filament current.

The voltage amplification constant of a tube can be easily measured by a simple bridge. Arrange a circuit as shown in Fig. 3 (b) and (c) are the plate and grid batteries respectively. (S) is a slide wire of about 40 or 50 ohms resistance. This should be about 3 or 4 feet long and stretched in a straight line, never wound on a drum, for best results. (E) is a buzzer having a secondary winding or a transformer connected to a suitable source of alternating current (about 500 cycles is best) and (T) a telephone receiver. To operate this bridge proceed as follows. Adjust the grid and plate batteries to the values that are normally used with the tube under test. Then adjust the slider (F) on the slide wire till a minimum sound is heard in the telephone receiver, then if (p) is the length of the slide wire on the grid side of the slider and (q) the length on the plate side

(q) divided by (p) gives the voltage amplification constant of the tube for the particular grid and plate voltages and filament current used. The lengths (p) and (q) can be measured in any convenient units, inches, centimeters or any other one as long as they are both measured in the same units. By this simple means the amateur can easily determine the voltage amplification constant of the tubes he is using.

The reader should not be misled at this point to think that the factor for a given tube will give the amount of amplification he can expect from an amplifying circuit. The amplification produced by any amplifying circuit depends largely on the type and electrical constants of the circuit as well as the tube used in it. The amplification constant, does, to be sure, give very nearly the amplification produced by certain types of voltage amplifiers. This matter will be discussed later.

In the next article certain types of amplifying circuits will be discussed.

WHY NOT A "CW" CLUB?

By LAWRENCE MOTT
Associate Editor

K NIGHTS of the CW!

Can we not get together and have CW nights?

Far be it from me to decry the Hon. Spark Brotherhood—of Vast Numbers and Degree! They are enthusiastic—oh, very!—gentlemen—all! They are—many of them—kindly, and well disposed toward us, of the CW few! But—taking it by and large—there is only a pathetically small number of Brothers' Sparks who will take the trouble to tune in for the sparsely scattered CW men? The spark emitters outnumber CW operators! They easily drown-out CW! And—without selfish intent, I am sure—they so far—have effectually blocked any efficient CW experimentation—that is, in and about Los Angeles!

Let me put it bluntly. CW is THE coming thing—in radio communication. I quite appreciate the point of view of spark men. They have—more or less expensively—set up unto themselves more—or less—efficient stations, and they like not the thought of having to choose between two—to them—evils: (1) junk the soon-to-be ancient and hoary spark—and install CW—or (2) give up radio work!

But Progress marches steadily onward—be it remembered! When radio was first discussed, the line owners laughed, loudly, long and uproariously—and fought radio effort—fearful as to that which would happen to their lines should radio become efficient! But was radio downhearted? NO! The world-wide recognition that it has earned for itself speaks with resounding loudness! So shall it be with CW—among the amateur enthusiasts!

However, all this by-the-way.

Perhaps fellow CW operators on the

Pacific Coast, and elsewhere, will join with me in trying to get together for say, two nights each week, at stated hours, and on pre-arranged, exact wave-lengths. I am convinced that in this way, and only in this way, can we do satisfactory work, and without causing the lease QRM to the spark chaps. In other words, I am a firm believer in "live and let live"! I ask a fair chance for CW work and investigational effort—from spark operators! If CW co-enthusiasts will immediately write to me, giving their operating wave-lengths, station data, details, etc., I shall, with pleasure, collect this material, assemble it in succinct form, arrange hours for CW work, and then beg the courtesy of Ye Ed of "P.R.N." to publish it. CW men will then have some authentic information that, as a nucleus, will, I hope, lead to excellent co-operation and effective results. I would further suggest that CW men form a Club, or Association, to be known as "The Pacific CW Club", or any kind, simply a small (as yet) group of men, banded together for the furthering of their lines of endeavor. Should such a Club come into existence I am sure that enough UN-SELFISH spark operators can be found who will not "hog" the air spaces on the nights that we are working, a short time each night. It is not much to ask, for the advancement of radio work!

And, to use famous (!) words, "may I not" point out to amateurs that the authorities at Washington are most kindly disposed toward amateur work in general, realizing, very properly, that these efforts, when conducted within the rules and regulations set down for them tend strongly for the good of radio advancement of these United States. BUT that Washington cannot, and will not, approve of operators who deliber-

ately and wilfully exceed wave-lengths the amount of power they use, is a foregone conclusion. The law-breakers, may and do, "get away" with this sort of thing for a time, but the day will undoubtedly come when a sudden official round-up will be made, and sad indeed will be the hearts of many amateurs, who now nightly fill the air with "horrid sound", on the broadest of broad kind of transmission. Should more severe restrictions be placed on the amateur classes, the recklessly-broad operators will be the ones that the rest of us will have to thank. And the innocent chaps, the fellows who are serious in their radio efforts, will suffer with the others!

Why all this senseless, useless chatter, night after night, hour after hour? A nerve-racking pandemonium of sound, in which CW is hopelessly lost! Owing to differences in time, if we, on the Pacific Coast, hang on until midnight, or after, to work a CW friend in the mid-west, or farther, that friend must sit up until 2 and 3 in the morning, to get any results, and it is an imposition to ask this, as a regular diet!

Hence I reiterate the plea: If CW operators can form a little Club of their own, with their own officers, will spark men give a bit of time, twice a week, to CW experiment and effort?

And will CW men, reading these lines and interested in the idea, write to me, at Avalon, Catalina Island, California, giving me the data that I have requested?

I would call attention to the fact that—having been granted a Commercial License, Experiment Grade, and a Station License to operate it on various wave-lengths—my call letters have been changed from 6BX to 6XAD.

The Station of U. S. Deputy Game Warden, Lawrence Mott, Situated at Avalon, Catalina Island, Calif., has been granted a Commercial Operating License—Experiment Grade—and the Call Letters changed from "6BX" to "6XAD". He asks that his many friends please NOTE this, when calling him, and when listening for him.

This Department is conducted by the U. S. Radio Inspectors of the Sixth District.
CO-OPERATE!

WITH THE RADIO INSPECTOR

Questions answered by
the Inspector.
No names will be printed.
Initial your letters only.

FOREWORD: THE RESPONSE TO OUR REQUEST FOR QUESTIONS TO BE ANSWERED IN THIS DEPARTMENT HAS NOT BEEN GENEROUS. WE AGAIN ASK YOU TO USE THESE COLUMNS.

AN OPEN LETTER FROM THE INSPECTOR

DEPARTMENT OF COMMERCE

Navigation Service

Office of Radio Inspector

Custom House,

San Francisco, Calif. March 15, 1921.

Editor, Pacific Radio News,
San Francisco, Calif.

Dear Sir:

I would like to call the attention of the readers of your Magazine to a few pertinent points in connection with the operation of amateur radio stations, chiefly as regards violations of the Radio Laws and Regulations.

1. The use of "two letter", or initial calls is unlawful.

2. No authority for wave-lengths in excess of 200 meters may be granted for radio telephone sets.

3. Telephone sets require licenses just the same as radio telegraph stations.

I have observed that, in a number of cases, amateurs who are assigned regular official call letters do not use them. Instead, they use the last two letters of the call (or three letters, as the case may be), and omit entirely to use the numeral part of the call. This constitutes, in effect, the signing of false call letters, as no call letters, or signals can be used by any station except the calls assigned by the Department of Commerce, which is given on the station license. This does not, of course, mean that "personal" signs may not be used, when there are several operators in a station, but if these latter are used, the full and complete official call must also be used at the same time so that no doubt as to the identity of the

station may exist to anyone who may happen to hear it working.

A number of experimenters and amateurs seem to be of the erroneous opinion that the use of operation of a tube telephone, or continuous wave transmitter is sufficient excuse to use a longer wave-length than 200 meters. This is absolutely and entirely contrary to law, and anyone who so operates is liable to prosecution under the Radio Laws, unless specific authority to use a longer wave-length has been granted under a special or experimental station license, in the usual manner. I might add that the desire to operate a telephone on these longer waves does NOT constitute any reason for the issuance of a special or experimental license.

In all cases licenses for both station and operator are required where the operation of a radio telephone transmitter is desired. These licenses and the examination for them are all exactly the same as for a telegraph equipment. This requires that the operator be able to copy at least 10 words per minute in the Continental Morse Code and to answer a number of reasonable questions concerning the operation and adjustment of his apparatus and the Laws and Regulations governing radio communication.

Contrary to popular impression, a telephone or vacuum tube transmitter will operate on 200 meters as well as on any longer wave-length. I have experimented

with vacuum tubes myself and have found no trouble in getting to 200 meters and even lower. I used two 5W. tubes on various wave-lengths. On 375 meters I obtained about 1.2 amperes and with the same apparatus I returned to 200 meters and the radiation dropped to about 1.1 amperes, and 180 meters, which was the lowest wave-length I attempted at this time, radiated just a little over 1 ampere. The natural period of the antenna I used was 140 meters, and on the lower wave-length I was only able to use an extremely small inductance in the antenna circuit, which inductance was not sufficient for maximum coupling. If my antenna had been a little smaller, I do not believe that the radiation would have decreased noticeably on the lower wave, and other experiments I have performed indicated the same result. I have seen one vacuum tube radiate efficiently on 90 meters, the radiation being about .6 of an ampere, on a single 5 W. tube. In this case the antenna had a natural period of but 40 meters, which indicates that the great trouble with most amateur telephones is that they are unable to get reasonable coupling on 200 meters, and I believe that if the amateurs who claim that they are unable to get their tubes on 200 meters will cut their antennae in half that they would have no trouble in reaching the wave-length they desire.

Respectfully, D. B. MCGOWN,
Asst. Radio Inspector.

QUESTIONS and ANSWERS

A. K. Selma, Cal., asks:

Ques.—I have a radio set which will not send outside of the state. It is a one-inch coil, and I am located in a small town near Fresno. Do I need a license?

Ans.—Yes. The law states that all stations must be licensed where they transmit to beyond the borders of the state, or WHERE INTERFERENCE WITH THE RECEPTION OF SIGNALS FROM BEYOND THE STATE WOULD OCCUR. It is not possible that a transmitting set of any kind could be so arranged so that some times its operation might not interfere with someone receiving signals from outside of the state, hence all stations, as well as yours, must be licensed.

Ques.—I have a copy of the Radio Laws and Regulations. It says that I may obtain a license by applying by mail,

as I am unable to come to San Francisco for examination. How is this done?

Ans.—Address Radio Inspector, 215 Custom House, San Francisco, and the necessary blanks will be sent you. It is necessary for you to show evidence, usually in the form of an affidavit, that you are able to send and receive at the rate of ten words per minute, five letters per word, and answer fully all the questions asked on the application blank.

F. G. G., Los Banos, says.

A number of unlicensed spark coils near me interfere greatly with me. I have a receiving set only. I tell these fellows they should have licenses, and they laugh at me. Is a license necessary? They interfere particularly with the reception of signals from Seventh District amateurs.

Ans.—Yes, they must be licensed. Heavy fines and imprisonment are provided for the punishment of persons who send without licenses. See answer above to A. K. of Selma. This clearly comes under the law's provisions, as the signals from the Seventh District come from outside the state.

R. J. L., Eureka, Cal.:

Ques.—Where can a call list of amateurs be obtained?

Ans.—The book "Amateur Stations of the United States," edition of June 30, 1921, is the best we know of. Send 15 cents (no stamps) to Superintendent of Documents, Government Printing Office, Washington, D. C., and the book may be obtained. A similar book, "Government and Commercial Stations of the United States," which contains all special stations as well, may be obtained for 15 cents from the same address.

ESENTIALLY, the Janke arc is an arc burning between two electrodes in a non-conducting fluid.

Practically every known metal has been used in the construction of experimental electrodes and several different kinds of non-conducting fluids have been tried in the many efforts to perfect the Janke arc, but the best results have been obtained by making the anode out of copper, the cathode of carbon, and by the use of denatured alcohol as the non-conducting fluid.

Strictly speaking, alcohol is not a non-conductor, but the term has been accepted by the United States Patent Office as applied to this arc. Alcohol does, however, offer an extremely high resistance to radio-frequency currents, and a somewhat less but still high resistance to direct current.

Under certain well defined conditions this arc will produce radio-frequency oscillations. Current is fed to the arc under a pressure of 200 to 500 volts. A capacity and inductance are arranged in the circuit as shown in cut 1. For wavelengths in the neighborhood of 1,000 meters the capacity should be 2 mf. The inductance is kept as low as possible. The electrodes are completely immersed in the alcohol. If now the arc is struck and adjusted carefully, strong oscillations are produced in the closed oscillating circuit, which may be transferred to the antenna through the oscillation transformer.

The arc is automatically kept in adjustment by a solenoid attached to the anode, which also functions as a choke coil.

The design and construction of this solenoid must be very exact.

The anode holder, to the upper end of which is attached the solenoid core, and to the lower end the copper anode tip, is constructed of brass tubing. Vents are provided so that the gas forming at the electrodes rises to the upper part of the container where it is cooled by the water cooling coils and condensed back into liquid.

The anode tip is of an inverted cup shape, which provides a small chamber wherein the arc proper takes place. This cup shaped anode fits down over the carbon cathode which is held in place at the bottom of the container by holders provided for the purpose.

When the arc is burning, a small pocket of hydrocarbon vapor is formed between the electrodes, which is the real secret of the oscillations. No magnetic field is used, however, to "scavenge" the arc, and therein lies its principle difference from the Poulsen arc.

Alcohol, being an excellent cooling medium, performs a second very important function in dissipating the intense heat of the arc. In performing this function, the temperature of the alcohol of course has a tendency to rise greatly, but is prevented from doing so by a set of copper cooling coils which line the inner wall of the container, through which cold water is circulated.

The oscillations produced by the Janke arc are not as steady as those produced by the Poulsen arc. For this reason they are unsatisfactory for telegraph purposes. They are, however, suitable to a certain degree for telephone purposes.

If the engineering skill were to be applied to the Janke arc that has been applied to other systems, a good radio telephone and telegraph system might be developed.

The problems presented in this small

The JANKE ARC

By H. L. RODMAN

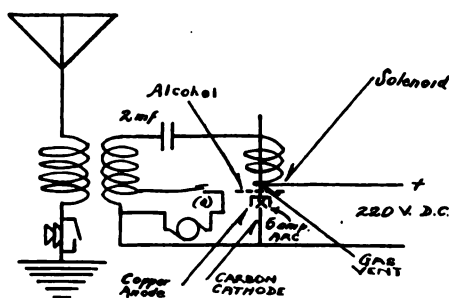
arc, however, are really very great. The difficulty and danger of a very highly explosive substance which is created on the electrodes while the arc is burning is one in particular.

This substance was shown by one chemist to be copper acetylid. A slight tap with a metal object such as a screw-driver will explode any quantity. It is extremely sensitive to impact and heat.

This explosive is only dangerous when the electrodes are lifted out for repairs or cleaning. As long as the electrodes are immersed in the alcohol, the copper acetylid is not dangerous.

As in the Poulsen arc, the cooling of the copper anode is important, and for this reason three sets of electrodes in series are used to provide a larger cooling surface.

Each anode plays in a sheath and a spider clutch is so arranged that when the arc is struck by the lifting solenoid, the length of each of the three arc gaps is identical.



Due to the fact that there is no means provided in this arc for restoring the resistance of the arc gap during the charging portion of the cycle, the efficiency is comparatively low. This same omission is also partly responsible for the fact that the oscillations produced are not as steady as those of the Poulsen arc.

By inserting a microphone transmitter in the ground lead, good telephonic results have been obtained, but here again is met the old problems of microphone current limitations.

The radiation must be confined to two or three amperes and even this current at radio-frequency will very quickly overheat almost any microphone.

The microphone most successfully used at the Fairmont Hotel experimental station, in San Francisco, were water cooled, but although the heat is rapidly carried off by water, the carbon granules are not prevented from becoming white hot, under which heat the transmitter rapidly deteriorates.

It will be noted that the closed oscillating circuit is inductively coupled to the antenna circuit. This is instrumental in weeding out harmonics. The tuning between primary and secondary is extremely sharp. A very slight detuning on either side of resonance will decrease the antenna current to almost zero.

This latter feature is brought into use when the set is used for telegraphing. One turn of the primary is shorted by a key, as at (a) in cut 1, with or without the chopper in series. The chopper may

be cut in or out by the chopper shorting switch.

When this one primary turn is shorted by closing the key, the open and closed circuits are thrown out of resonance and the antenna current drops to nearly zero.

Using a wavelength of 1,800 meters, it is only necessary to detune the primary 75 to 100 meters to produce this effect.

Due to the fact that the potential difference across one turn of inductance is very low when using a current of five amperes through the arc, there is almost no sparking at the key or across the chopper when the latter is used. The note produced by the chopper is fully as clear as is obtained by the chopper interrupting a direct current circuit of equal current.

This method of signalling proved much more satisfactory than putting the key and chopper in series with the ground lead. The microphone placed in this position, however, does not function anywhere near as well as when directly in series with the ground lead.

It is apparent that in this system a low ground resistance and an antenna carefully designed as to capacity for the wavelength and power to be employed are of utmost importance. The antenna circuit, including the turns of inductance used, must be of the lowest resistance possible to obtain maximum radiation and over-all efficiency.

There are possibilities in this arc, and it is not difficult to construct an experimental set. The fact that no magnetic field is necessary as in the Poulsen arc makes the construction of the arc proper comparatively simple.

A one-half kilowatt set operating on 110 volts has been used successfully but the efficiency decreases on low voltage. 220 volts has been found to be most satisfactory.

This arc has also been applied to experiments in other branches of high frequency work, and there are also unlimited possibilities there, as well as its application to medical science.

As to practical results obtained, with a radiation of 2.75 amperes in the antenna at the Fairmont Hotel, San Francisco, the voice was heard and the conversation reported in detail by an operator at Vancouver, B. C., and by ships at sea in the neighborhood of 1500 miles.

But it all comes back to the current carrying limitations of the microphone. Some other system of modulation must be used other than a microphone transmitter inserted in the ground lead, to make this system a success for long distances. This, of course, is not by any means impossible.

The Janke patents are owned by the National Radio Company, of San Francisco, Calif.

LIEUT. F. W. STONE ADDRESSES COMMONWEALTH CLUB

RADIO Telephones were the topic of a lecture by Lt. E. W. Stone to the members of the San Francisco Commonwealth Club recently. A complete receiver was installed at the Palace Hotel and the members were entertained with music from the California Theatre.

THE DUO-FREQUENCY SYSTEM OF SEMI-SECRET TRANSMISSION

By H. Tenny

ALTHOUGH the fact has not become generally known in the amateur world, we are about to witness a remarkable development in vacuum-tube transmission, which will be caused by the application of the multi-frequency principle, the apparent possibilities of which are truly astounding.

The extent to which this latest phase of vacuum-tube work has been developed in the laboratories of the large electrical plants who are exploiting the vacuum tube is only a matter of conjecture. The writer has heard vague rumors which lead him to believe that the bulk of present research work is directed toward the development of super-imposed frequencies on undamped waves with the objectives of multiplex transmission and reception, reduction of interference, secrecy of transmission, and increased utilization of restricted wave-length ranges permitted by law for certain classes of communication.

The realization of these invaluable benefits is being sought through the utilization of the range of frequencies which lies between highest perceptible audibility (about 6,000 cycles per second) and lowest common radio frequencies (wavelength of 10,000 to 15,000 meters.)

The simplest application of this principle consists of:

- The generation and radiation of an undamped radio frequency, preferably the optimum length with respect to the fundamental of the antenna.
- The superimposition on this "carrier" of one or more secondary frequencies, which will effect, in equivalent, "100% modulation." These frequencies will preferably be above audibility and below radio range.
- The modulation of these frequencies for signaling purposes, either by voice, chopper, or key.
- Primary reception of carrier frequency with standard receiving apparatus.
- Selective individual tuning of the superimposed frequencies by means of separately coupled tuned amplifier circuits.

A schematic and purely theoretical circuit which will, to a certain degree, accomplish these ends, is shown in Figure 1. The practical working of such an arrangement would be for a number of reasons, an impossibility.

For preliminary experimental purposes we may confine ourselves to a single secondary frequency, using a single power tube as a generator for both the carrier and secondary frequency. Within certain limits this can be successfully done, and has the advantage of requiring none but standard and common pieces of apparatus which can be easily and cheaply obtained.

In the "Colpitts" transmitter circuit the secondary frequency can be generated by regenerative coupling between oscillatory circuits placed in the plate and grid leads, the frequency generated being the frequency of the grid circuit. As illustrated in Figure 2, honeycomb or duolateral inductances of the 1200

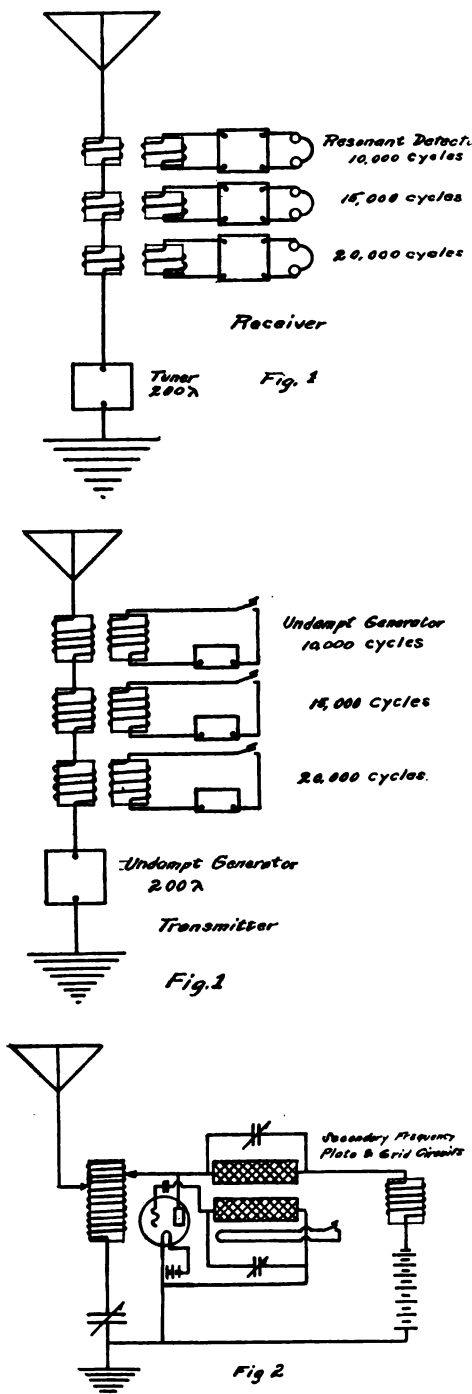


Figure 1. Transmitter and Receiver diagram.

Figure 2. Secondary Frequency Modulator, adapted to Colpitts Transmitting Circuit.

Figure 3—Standard Regenerative Receiver equipped to Heterodyne secondary frequencies.

Figure 4. Secondary Frequency modulation by Heising system.

Figure 5. Amplification of secondary

turn size can be used with standard variable or fixed receiving type condensers for forming the circuits. Signalling for transmission can be best accomplished by coupling several turns of inductance to the grid coil, short-circuiting them with the sending key. Pressing the key will then cause a change of inductance in the grid coil, changing the frequency generated, and will be tuned for at the receiving end in the same manner as for compensated-system signals in highpower arc work.

The minimum capacity of the condensers used should be not less than .0005 MF, as the secondary circuits will otherwise have a choking effect upon the short-wave carrier frequency.

The secondary-frequency circuits are placed in the receiving circuit as shown in Figure 3, using coils and condensers identical in size and characteristics as those in the transmitter.

The operation of the system is best proceeded with as follows:

- Adjust transmitter to maximum radiation of carrier frequency.
- Gradually increase feed-back coupling between plate and grid coils of secondary-frequency circuits until oscillations are produced, keeping shunt condensers at maximum capacity.

Secondary oscillations can be detected by their effect on the reading of the radiation meter. The system will be at the most efficient operating point when the antenna circuit has increased to about ten or fifteen per cent above normal. This increase is due to the change from the average current of the carrier frequency to the R.M.S. current-reading of the super-imposed secondary frequency. If the generation of the secondary frequency stops the carrier oscillations, retune the transmitter to a more stable adjustment.

- Couple the compensating key inductance to grid coil as shown in Figure 2, using carbon-granule microphone in place of key if speech transmission is desired.

(d) At the receiving end: Cause the receiver to oscillate at radio frequency weakening coupling between plate and grid secondary-frequency coils to prevent generation of secondary oscillations. Adjust receiver to the tune of the transmitted carrier wave, which can be heard by the heterodyne effect, the beat note of which must be adjusted low enough to be inaudible, in other words, the oscillations of the receiver grid circuit must be in exact synchronism with the received oscillations.

- Gradually increase coupling between plate and grid coils of the secondary frequency circuits until oscillations are produced.

frequencies by resonant transformer method, using regenerative and oscillating amplifier circuit.

Figure 6. Duplex reception with one tube, using compensating keying on both carrier and secondary frequency.

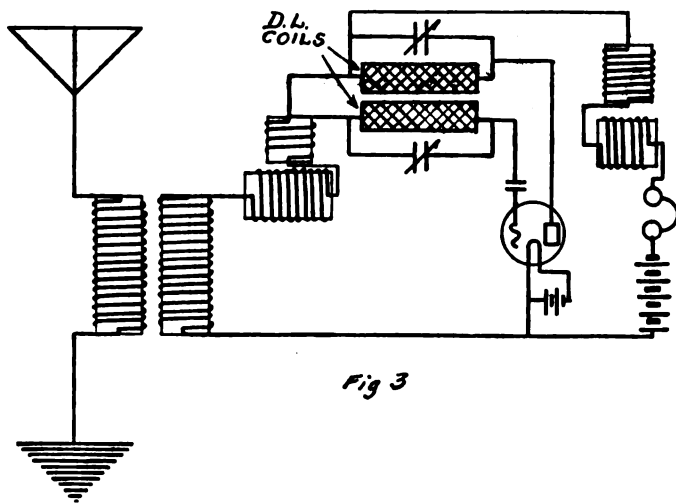


Fig 3

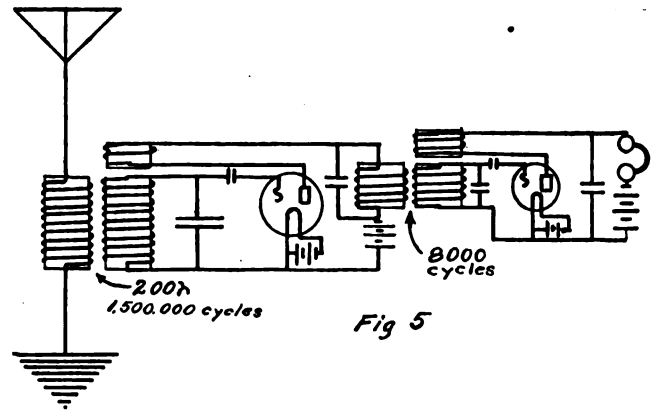


Fig 5

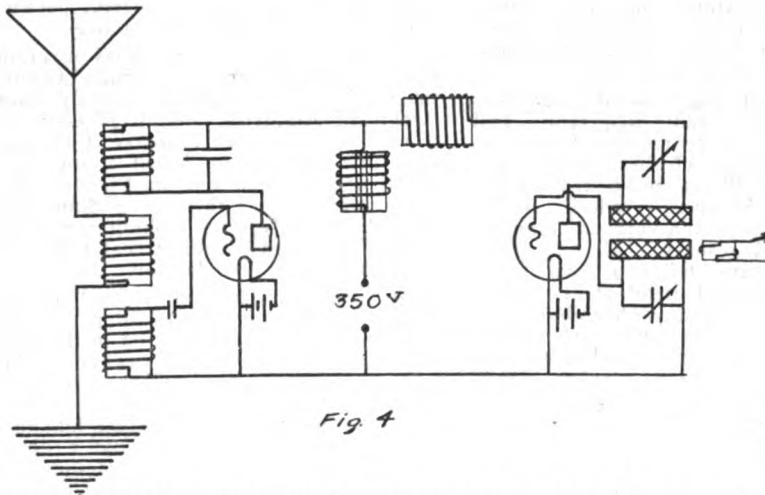


Fig 4

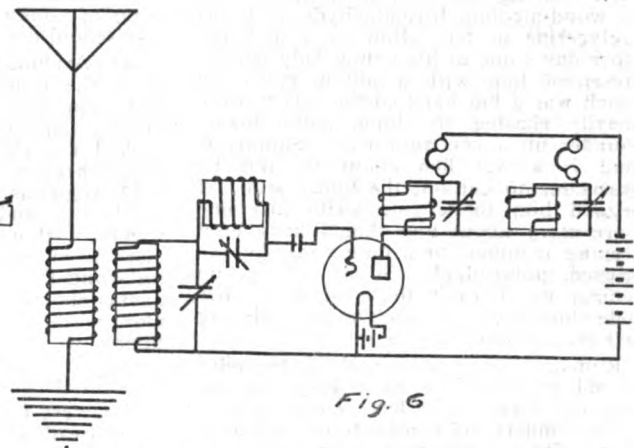


Fig 6

tions are generated. Vary the frequency so generated by tuning with the condenser shunted around the grid coil, until the beat note of the transmitted secondary frequency is heard in the phones. This beat note, and therefore the signals transmitted on it, can only be heard on the ordinary regenerative receiver unless the auxiliary circuits herein described are used.

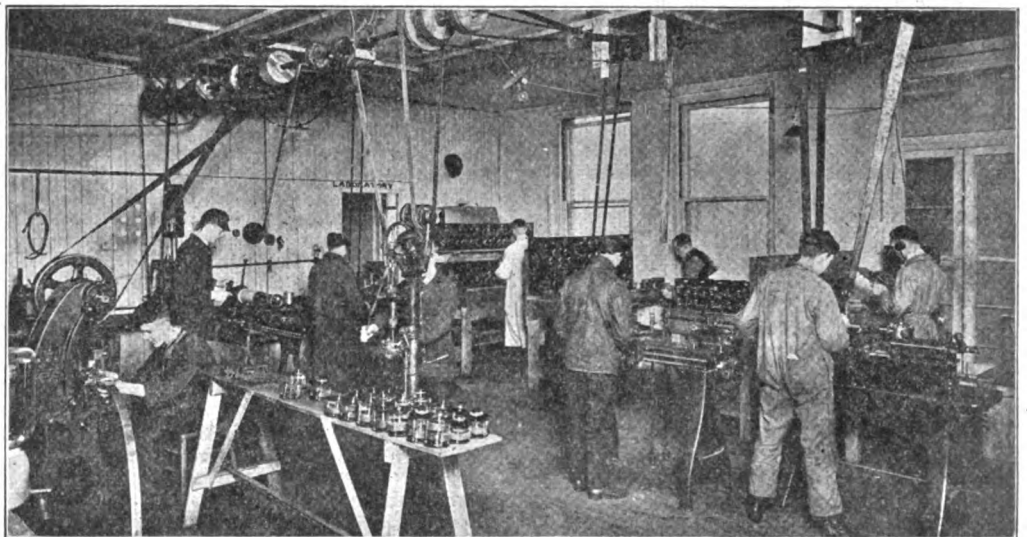
The advantage of such an arrangement are: Secrecy, or semi-secrecy of transmission, increased convenience in heterodyne receiving due to the less critical adjustment of beat note due to lower frequencies heterodyned; possibility of duplex transmission and reception, using compensation method of signalling in both the carrier and secondary frequencies; adaptability of secondary frequencies to multi-step amplification without the drawback of the extremely critical adjustments necessary in the ordinary 200 meter radio-frequency amplification by the r. f. transformer method.

Figures 4, 5, and 6, will indicate the adaptability of the system to the most well-known of modern vacuum-tube circuits.

PALO ALTO WIRELESS \$175,000 PLANT IS READY FOR ACTION

The Federal Telegraph Company's new \$175,000 wireless station has just been completed, according to Chief Engineer R. R. Beal of the Federal company, and will be the hub unit of a Coast system now being erected in various other parts of the Pacific Coast. This station is the first in the world to carry on communication with four different stations at one time, and has umbrella type of antenna system, with a diameter of 3000 feet. Similar stations are being erected at Portland, Or., and Los Angeles.

Rapid Growth of Pacific Coast Manufacturer



THOSE who have been following radio development in the West have watched with interest the growth and development of The Colin B. Kennedy Company of San Francisco. This organization was started less than two years ago by the man whose name it bears. Following the example of many of the great figures in the world of American business today, Kennedy started in a very small way. In fact he began manufacturing in a small loft with a few tools and the assistance of one boy. He has now associated with him a very

capable group of engineer executives to assist in the design and development of the apparatus and in the conduct of the business.

The expanded organization is looking to the future of radio with the same vision which inspired its founder. The radio development of the future is firmly linked up with the interests of the individual experimenter and student.

The photograph above, which is reproduced from a recent issue of the "Journal of Electricity and Western Industry", shows a corner of the factory where Kennedy Equipment is produced.

ARCHIBALD AUGUSTAS GETS A SCARE

(By Volney G. Mathison)

Author of: "A Bungled Affair," "The Fall of Samuel Jones," "Tougher Than a Goat," and others.



SAMUEL JONES swears that if I don't leave off writing about him he's going to break my darned neck. He says he is getting to be the laughing-stock of the town and his reputation is ruined (I didn't know it could be). He indignantly declares that a local chemical factory has sent him a letter quoting him special bargain prices on wood-alcohol, formaldehyde, and nitroglycerine in ten-gallon lots; and the other day some of his young lady friends presented him with a pillow cover on which was a big hand-embroidered snake merrily chasing the long, lanky brass-pounder up a cocoanut tree. Samuel is mad is a wet hen about it, and he warns me to cut out the funny stuff. I begged him to let me write just one more story about him that I have been keeping in mind for a long time, but he refused, point-blank. So now I am up against it. I can't think of any other code-slinger who is such a side-splitting jackass as Samuel Jones.

Rumaging around through all the piles of old trash in the back alleys of my memory, however, I have come upon a sack of musty old recollections that have to do with a gone-and-forgotten wireless school that used to be in an old, ramshackle building down near the Frisco water-front. Many years have slipped by since I sat in at the long practice table and went through the daily copying grind, starting in at nine a. m. at the top of the front page of the morning "Examiner" and winding up at five p. m. at the bottom of the last page of the evening "Bulletin," but the singing of the practice buzzer and the inky smells from the print shop on the floor above come back to me as vividly as though they were of yesterday.

And no less distinctly do I remember the faces of that assembly of young villains (Samuel Jones were there, too, but I'm not writing about him, remember), who studied the function of the commutator by plastering thin, invisible chips of mica on the lower ends of the brushes, or demonstrated the actions of a closed oscillatory circuit by running a piece of number forty magnet-wire from the spark-gap and deftly fastening the end under the knob of the sending-key, where some poor devil's thumb was sure to get tangled up in it. This stunt was invented by Shakespeare, the school poet, who could rhyme decrement with devilment as easily as he could do sleight-of-hand tricks with spare receivers or detectors or anything else lying around not so big as to rip his coat-pockets. Then we had Kid Brady, the house-breaker, who left his meal-ticket in the school one Saturday night and who, coffee-and-less and hungry, got pinched next morning as he climbed up the rain-spout and jimmied a back-window to get it.

"A very select body of students," the school circular called them, but a very villainous band of hundred per cent hooligans would have been better said; at least so declared Pop Cranby, the in-

structor, who led a dog's life among them. Indeed, I remember how one time that gang of heartless young hyenas got hold of a poor unsophisticated ham, fresh from the country and in a hurry to get a job, and persuaded him to—but that reminds me of my friend Archibald Augustas. I'm mighty glad I thought of Archibald because he makes me think of a rattling good story, and now Samuel Jones and the rest of that hair-raising band of young Apaches in the old wireless-school can go to the devil.

Mr. Archibald Augustas McGink used to be the assistant radio inspector. Tall and slim and supercorrectly dressed in classy tailor-made clothes, he always looked exactly like a bill-board ad for Kubbleheimer Klothes. Indeed, Archibald Augustas was the very embodiment of dignity and reserve. All the hams within a thousand miles of San Francisco lived in mortal dread of him. And no wonder. In his day, Archibald Augustas shortened down and sharpened up more wave-lengths, and scared more contumacious, law-breaking wireless fiends to death than any other man has ever done in the history of radio.

Nor were the amateur fanatics alone in their dread of Archibald Augustas. He was no less the terror of the regular sea-going brass-pounders; for he used to give them their license examinations. Everybody knows what a cold and unfriendly sort of dungeon a radio-inspector's office is, at best. Everything is stiff and formal and you always get a creepy feeling in the middle of your back as you listen to the dictation of a stern and awful letter proclaiming the license suspension of some depraved operator who has been found guilty of making superfluous signals to the outrageous extent of saying good morning old man to a fellow code-slinger, or perhaps some scoundrelly ham is being skinned and scalped for running his outfit on two hundred and one and a quarter meters, and so on and so on, *ad infinitum*. Put a reserved and coldly proud person such as Mr. Archibald Augustas McGink in such an atmosphere and you could not find a more frigid combination anywhere south of the north pole.

One chilly winter morning, punctiliously at nine a. m., Archibald Augustas stepped dignifiedly into the office, put away his hat and overcoat, bid Miss Frimble, the stenographer, a frozen good morning, and seated himself stiffly in the chief inspector's chair. Mr. Woodnut, the chief radio inspector, had just killed the decrement of the high-power station out at Bolinas, and today he was going out with a shovel to bury it, leaving his assistant in supreme command of the front-line trenches. So Archibald Augustas sat proudly in the chief's big swivel-chair and importantly proceeded to read the morning mail.

While the assistant inspector was thus occupied, Miss Frimble sat gazing upon him; and as she gazed she sighed, deeply and longingly. Tall, skinny, and scrawny, Miss Frimble was the faded vet prim remains of a bud that had bloomed and

blossomed so long ago that—but this is no ancient history, anyway. She adoringly idolized Archibald Augustas and whenever occasion offered plainly showed that she thought him a perfectly wonderful man. Aware of her sentiments, the assistant inspector felt a profound secret disgust; though he sometimes consoled himself by reflecting that he couldn't help it if his wonderful personality was so irresistibly attractive.

By nine-fifteen a. m., Miss Frimble had, as usual, sighed wistfully twenty times as she sat looking hungrily upon Archibald Augustas, and at nine-sixteen a. m. she was about to make it twenty-one times, when she heard a sound of shuffling footsteps out in the corridor. A moment later, the office door was opened suddenly, and looking toward it Miss Frimble saw a sight that froze her maidenly blood with horror.

She had ample reason to be horrified. A hideous black negro had slipped boldly into the office and now stood in the middle of the room, fidgeting strangely. Clad in a pair of ragged Charlie Chaplin trousers, with shoes to match, a shapeless felt hat jammed down on his head and wearing an old dirty coat a dozen times too big for him, he was indeed a frightful-looking object. Miss Frimble sat like one paralyzed.

Archibald Augustas had also heard the door open. For a few minutes, he affected to be busy with the mail on his desk; then he ostentatiously swung the big swivel-chair round and condescended to look at the negro, who was still standing, nervously shifting his weight from one foot to the other.

"Well?" interrogated Archibald Augustas, in his best secretary-of-the-navy style.

"I-I want to t-take the examination f-for a commercial f-first grade license," stuttered the dark-faced youth, acting as though a good deal embarrassed.

"Very well," replied the assistant inspector, coldly and without interest, "sit there,"—he indicated a small writing table near the stenographer's desk.

"Please give him the application-blanks, Miss Frimble," directed Archibald Augustas, a trifle puzzled at the old maid's evident alarm. It was the first time a negro had ever come to take a license examination, but still there was nothing surprising about it. The assistant inspector swung his chair around again and resumed his reading of the mail.

With extreme trepidation, Miss Frimble picked out the required blanks and laid them on the writing-desk before the frightful-looking negro; and then she fled to Archibald Augustas.

"Mr. McGink, are you blind!" she hissed into the sensitive ear of the assistant inspector. "Can't you see that awful fellow is wearing a disguise?"

Tremendously irritated at the rude way the homely stenographer hissed in his ear, Archibald Augustas shot around in his chair, an angry reprimand burning on his lips. But Miss Frimble's face was a sickly grey, and she was watching the

negro fearfully out of the corner of her eye. Involuntarily, the assistant inspector followed her glances, and with startling suddenness, he perceived that she was right. The fellow was not a negro at all. His face was twice as black on one side as it was on the other, and a small white spot was plainly visible behind his right ear. His slouch hat was still pulled down onto his ears, but there was a bunch of hair resembling the frayed end of a manila hawser sticking out at the back, which looked strangely out of place on such a black person. As he wrote on the application blanks, the black stuff on his hands came off onto the paper, smudging everywhere.

"Yes, I knew he was disguised the moment I saw him," lied Archibald Augustas, affecting a calmness that he absolutely did not feel at all. "Go back to your desk and remain perfectly quiet. I will—er, I shall attend to him presently."

Bestowing an adoring glance upon Archibald Augustas, in appreciation of his wonderful courage, Miss Frimble retreated to her post, leaving the assistant inspector a great deal more alarmed than herself.

After a few moments, Archibald Augustas cautiously stole another glance at the disguised villain, and a cold dread suddenly clutched at the assistant inspector's heart as he observed that despite the blacking on the fellow's face, he bore a startling resemblance to an ugly-tempered Mexican amateur of North Beach, whom Archibald Augustas had brought to justice not long before for malicious interference with the naval stations, and who had openly sworn that he would be revenged both for the confiscation of his apparatus and for the hundred-dollar fine he had been forced to pay. The more the assistant inspector looked, the more certainly did he seem to perceive that the black scoundrel who had him so neatly corralled was just that same Mexican. Archibald Augustas could see through it all closely. Somehow, the fellow had learned of Mr. Woodnut's absence, and he had chosen this time for getting a bloody revenge.

Archibald Augustas was convinced that he was in awful danger. Already could he feel the keen blade lunging in between his ribs and things, and he winced and sickened as he imagined the grinning murderer taking a savage delight in twisting the knife around in his vitals like an angry farmer cranking a contrary Ford. The assistant inspector broke into a cold sweat. He tried to think what to do, and he immediately realized that there was only one thing to do; he must get away, somehow, anyway—and mighty quick.

But that was easier thought of than done. Though there was a window close at hand, it was sixty feet to the street; and the black villain was sitting directly between Archibald Augustas and the door. It was a desperate predicament.

The assistant inspector soon decided that he had better make a dash for freedom rather than sit helplessly waiting for the murderous Mexican to spring upon him. There was a water-cooler near the door, and he made up his mind that he would step over to it, pretending that he was merely going to get a drink of water. Once that far, he would stand a slightly better chance of getting to the door, alive.

Mustering every atom of his insignificant stock of courage, Archibald Augustas arose hesitatingly from the big swivel-chair and walked nervously toward the water-cooler. He got to it safely, and was about to keep on going toward

the door, but glancing warily at the disguised malefactor, from whom he was now separated by no more than the width of a desk, he saw that the fellow seemed to be watching him sharply. Instantly, the assistant inspector's mite of courage took wings and flew away. He leaned weakly against the cooler and shakily drew a glass of water. Just as he made to drink it, the pseudo-negro inadvertently bumped his elbow into a large stack of books lying on the table at which he was sitting.

The books fell to the floor with a loud slam. Dismayed, Archibald Augustas involuntarily sucked in his breath, taking the glass of water down his windpipe instead of his throat. Choking and terrified, and still clutching the drinking-glass, he shot to the door in a single stride. About one hundredth part of a second later, he had vanished.

But we must not forget poor Miss Frimble! Fairly petrified with horror and dread at having been thus shamefully abandoned by Archibald Augustas, she could only sit gazing fascinatedly upon the hideous black villain who confronted her.

The pretended negro was obviously much worried at the sudden disappearance of the assistant inspector. Finishing with the application blanks, he became aware of Miss Frimble's frozen gaze and he began to shift about, nervously.

Minutes passed. The clock on the wall ticked with oppressive loudness in the absolute stillness of the room. Miss Frimble sat as though made of stone, without seeming even to breathe. The disguised stranger became increasingly nervous and fidgety. At last he could stand the scrawny stenographer's horrified stare no longer.

"Aw, what th' heck's the matter with you!" he burst out, in a voice and accent strangely unlike that of a negro, or of a Mexican either, for that matter. "You don't have to sit there an' look like I was goin' to chew yuh up, you homely old battle-axe!"

"E-e-e-e-e! Murder! Help!" screeched Miss Frimble, springing to her feet and upsetting her chair. Electrified with terror and shrieking like the whistle of a piney-woods logging train, she made a giraffe-sprint to the door.

Just as she got to it, the door was violently thrown open and Archibald Augustas was kicked forcibly into the room by a big brawny policeman, who had the squirming assistant inspector firmly grasped by the back of the neck. Instantly, Miss Frimble threw her arms around her hero and renewed her ear-splitting squeals.

The bluecoat caught sight of the black-faced cause of all the commotion and his eyes bulged with astonishment.

"In th' noime of th' hivinly St. Patrick!" he ejaculated, letting go of the assistant inspector. "No wonder yez was runnin' down the shreet loike twinty million devils was afther yez, begorrah!"

He slammed the door shut and placed himself against it, while Archibald Augustas struggled to untangle himself from the distasteful embrace of the frantic Miss Frimble.

"Yez be a grand lookin' sight be'ant yez!" exclaimed the policeman, staring at the dark youth's astonishing disguise. "Whur in th' devil did yez come from, an' what be yez thryin' to do here?"

"I know him, officer," panted Archibald Augustas, who has at last managed to free himself from the hysterical Miss Frimble. "He's a fellow we arrested and fined not long ago for malicious

interfering. He said at the time he'd get even—he's a Mexican."

"Mexican your foot!" interjected the black-faced mystery, who seemed to be making a desperate effort at calmness, "I'm off'n the Chilean square-rigger lyin' out in the stream off Goat Island, if you want to know!"

"Yez talk more loike a West Oakland hoodlum than a Chileno," retorted the policeman.

"Well, I ain't no Chileno an' I ain't no hoodlum, neither," returned the mysterious captive. "I shipped cabin-boy last year on the steam schooner '*Norwood*' goin' to South America, an' I got left at Valparaiso, down in Chile. Then I got shanghaied onto the '*Madrone*' a Chilean three-masted bark, where I been kept prisoner ever since. We come into Frisco Bay about a week ago an' one night I went over the side an' swum ashore, but the next night the Chilenos spotted me down on the water-front an' they blackjacked me an' took me back aboard. Night before last I jumped out in these clothes an' the black show-paint so the spigs wouldn't nail me again. But I reckon my outfit ain't much good."

"Begorrah, no! Tis mighty quear yez wasn't picked up sooner. But what were yez wantin' up here?"

"I used to have a amateur wireless set once, an' I know a good deal about wireless," replied the captive, promptly. "I was goin' to try an' get a license an' get out on a ship. If I go down on the front an' try to ship cabin-boy again, I'll get crimped again sure."

"What's your noime, an' whur did yez come from in the furrst place?"

"Frank Morris, an' I come from Petaluma."

The policeman scratched his head. The distinguished youth's story was more than half plausible. He was hardly more than a boy, and it was not the first time the bluecoat had heard of victims being shanghaied and held prisoner aboard foul South American hookers. But yet, there was something strange about the fellow's coming into the radio inspector's office while wearing such a make-up.

"I guess yez'll have to tell it to th' judge," decided the policeman, "come along."

The captive protested, strenuously, but the bluecoat got him firmly by the coat sleeve and marched him down the street, accompanied (though not assisted) by Archibald Augustas.

Twenty minutes later the trio were in the police station. The prisoner was handed over for cross-examination to a couple of raspy-voiced detectives, who raked him over the coals for half an hour without succeeding in budging him in the least from his story.

A little later, he was hailed before a police judge. Archibald Augustas and the policeman told of their parts in the affair, and then the prisoner repeated his story, exactly as he had told it before in the radio inspector's office. The judge listened with no great interest; he seemed inclined to accept the youth's statements.

"I don't see that the prisoner is guilty of any particular offense—" he began, but before he could say more one of the detectives came hurrying into the courtroom.

"Beg pardon, your honor," he broke in, abruptly, "but we just phoned the marine exchange, and they say there is no Chilean ship of any description in the harbor; and according to the nautical register there's no such vessel as the '*Madrone*' at all."

(Continued on page 347)

NEW YORK RADIO CONVENTION & EXHIBIT SHOWS MARVELOUS ADVANCE IN RADIO DESIGN

(By Arthur H. Lynch)

March 16, 17, 18 and 19 were indeed days of great radio activity in New York. A convention and exhibition was held on the roof of the Hotel Pennsylvania, under the auspices of the Executive Radio Council, Second District.

Many new forms of improved apparatus were publicly demonstrated for the first time, and the interest shown proves conclusively that the surface of amateur radio endeavor has only been scratched. Every moment of the event indicated that great strides have been made in the past few months and that the future will be productive of surprises beyond the wildest dreams of yesteryear.

With several complete receiving stations in operation, most of which were equipped with loud-speakers of one kind or another, there was never a quiet moment, and to the uninitiated the affair brought back the story of the Tower of Babel.

Much interest centered about a miniature automobile which was run about the floor, controlled by radio. Its movements were most uncanny, as no human activity was to

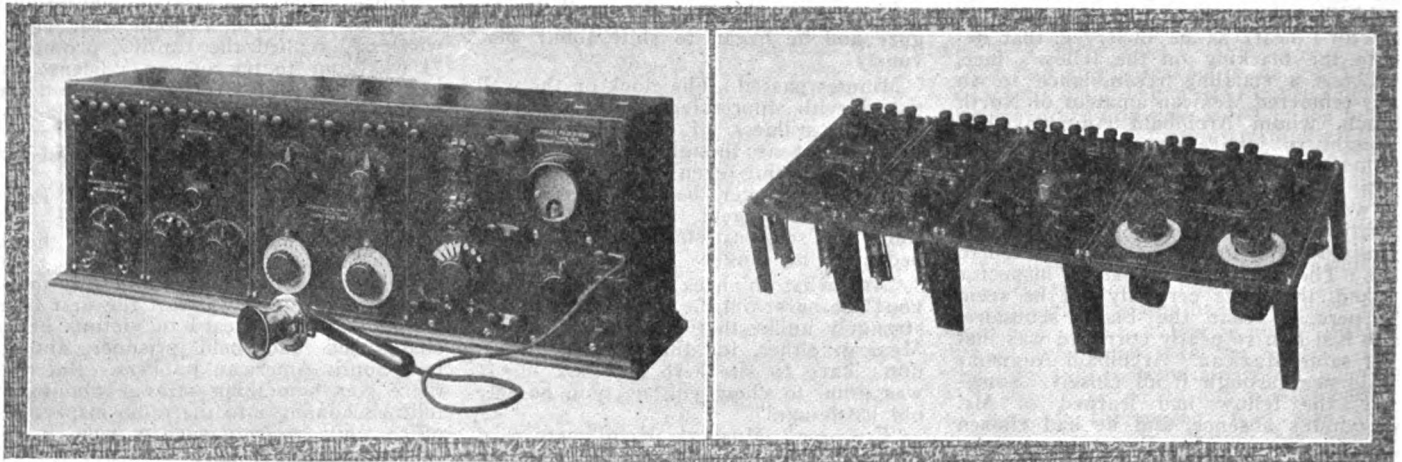
words had been passed, but these two went into the finals alone.

New Devices Demonstrated

One of the most unique devices shown at the exhibition was as startling in its importance as it was small in size. It was a new type Pacent telephone plug. It is no longer necessary to take off the telephone tips from the cords when the phone is to be used in connection with a plug and jack control outfit. The accompanying illustration tells the story better than words. You will see, from them, that a single screw holds all the members in place. There are two sets of phosphor bronze clips, which are merely pressed together to allow the tips to pass through holes in them, and hold the tips securely when the pressure is released. The same applies to the use of solid conductors. The connected tips are then inserted into the grooves in the moulded bakelite pieces, which are then screwed together. The tension cord, which is usually provided with telephone cords, is held securely between the two bakelite sections, so

Radio Corporation on the Job

Among the sages of amateur radio endeavor the opinion was frequently voiced that one could safely bet his bottom "iron man" on the fact that there was money to be made in the manufacture of amateur equipment and the future was all to the good, because the Radio Corporation was going into the thing on a wholesale basis. The opinion was everywhere expressed that they were not going in the amateur apparatus business for the sole purpose of doing the amateurs a favor. Our old friend, Mr. Boucheron, was very much on the job and spent a great deal of his time accepting congratulations from his many friends upon his accession to the throne of Director of Publicity of the Radiocorp. Under the direction of Mr. Galler, who smilingly answered more than a million foolish questions during the exhibition, the amateurs and the professionals were introduced to a most remarkable little piece of apparatus. It is an outfit, made entirely of parts which may be procured from any radio supply house, which Mr. Galler uses for demonstration purposes



be noticed and no sound was to be heard. A station, located in the exhibition hall, controlled the action of the auto, which closely resembled a torpedo on wheels and equipped with a mast, from which a spiral coil hung.

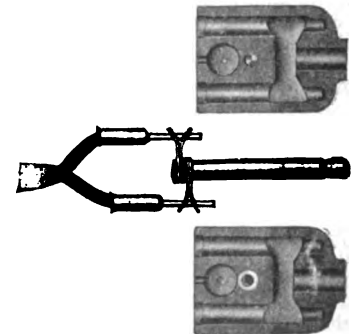
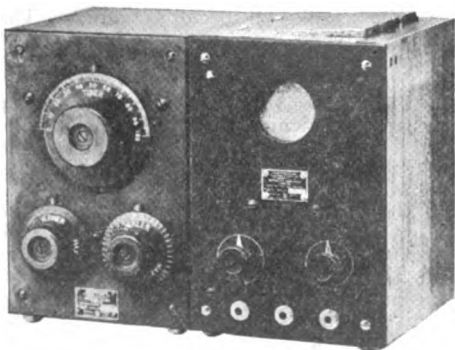
Each day was livened by talks, delivered by representative amateur and commercial radio men, and much interest was shown in the speed receiving contest, which was won by Bennie Seuter of the New York "Times" trans-ocean press staff, who attained a speed of 483-5 words a minute for two minutes and made no mistakes. Second honors went to N. Bernstein, who attained the same speed, but made two mistakes. Many others stuck in the contest until forty

that everything desired in a plug has been taken care of.

Another innovation, found at the Pacent Electric Booth, was a new form of condenser, developed by Dubilier, for C. W. transmission. The condenser itself is a radical departure, in that it is very small in size and unpretentious in appearance, though it has been well designed and built. Its most conspicuous change from the usual run of Dubilier condensers lies in the fact that it is equipped with a new insulator which will doubtlessly prove of great value to radio in general, but especially to the amateur. It is common knowledge that much amateur antenna current is dissipated because of poor insulation. This new condenser, upon which the insulator is mounted, will go a long way toward increased radiation because of reduction of losses in the power circuits. It is made of many thin sections of pure ruby mica, tightly pressed together and turned to size. After the insulator has been turned to the proper proportions, which includes the making of the flutes, found on insulators of the moulded types designed for the same purpose, it is impregnated by a special compound. The new insulator is soon to be made in forms which may be used for antenna insulation, though the present applications are exclusively for panel and the described mounting.

when he makes visits to such foreign missions as Boston. There is much to say concerning this little outfit. It was designed for connection to any lamp socket, where 110 volts of the A. C. variety is to be found. It is complete, with a carrying case, which measures 12x10x6 inches, including everything.

The set was made by Milford Squire, a former amateur who is making a name for himself as a designer of efficient radio apparatus. The set, complete, consists of everything essential for an A. C. self-rectifying transmitter, including a dummy antenna circuit wherein there is a variable resistance and capacitance, while the regular



The New Pacent Plug

antenna inductor affords the variation of inductance, either in the dummy or regular antenna circuit, depending on the position of the switch. The set has been designed for normal use of 10 watts, but will stand 100 per cent overload, without overheating, so that 20 watts could be consistently delivered to the antenna for demonstration purposes. Though the set was designed for telegraphy, it can be used for telephony by merely inserting rectifiers.

Other New Manufacturers of Note

With several new devices, including storage batteries, battery chargers, crystal detectors and a combination short-wave regenerative receiver unit and a detector and two stage audio frequency amplifier, the Westinghouse Electric and Manufacturing Company is blazing the trail in the race for the lead in the construction of amateur radio equipment. This company has recently secured the services to many men whose patents and research work in radio will be of value in producing other apparatus to round out the line, which will incorporate all the company's name stands for. If all the apparatus is to be as good as the tuner and amplifier units, it will be good. The circuit is of unique design, in that the inductance and capacity are changed at the same time. There is not enough space to describe it here, but you can take it from one who tried it, the receiver certainly tunes sharply.

Ship Owners' Radio Service, Inc., had a half kilowatt quench spark set hooked up and ran the official station for the transmission of messages, to all parts of the country. For receiving they used a Grebe CR 3 and a Grebe detector and amplifier unit. The transmitter was a Kilbourne & Clark development. At this booth there was also shown a new De Forest radiophone transmitter, but great interest was shown in the new "B" battery which the company has just started to sell. The station cleared forty-eight messages in forty-eight minutes.

Every once in a while from the corner in which Grebe and his company had their booth, a shrill piercing sound came forth, caused by our friendly enemy POZ. LCM also kept up a continual round of high speed stuff, which gave the fast "ops" an opportunity to exploit their ability to the awe of the beginners and the ladies, most of whom wondered what it was all about. In addition to the regular Grebe line, the CR 6A came in for great attention.

The two illustrations will serve to indicate the general idea of the new line which the De Forest Company now offers for sale. As will be seen, each unit is complete in itself, but lends itself very readily to use with other units, which may be procured at any time. The set in the cabinet is the MIDGET RADIOPHONE, complete, with a short-wave regenerative receiver, made with honeycomb variometers, a detector unit and a single stage amplifier unit. The cabinets may be secured for any desired number of units, but while the set is being gathered together, the legs, shown in the other illustration, serve to hold the units either in the position shown, or upright.

Baldy Phones were much in evidence, both at their own booth as well as in many of the stations which were in operation.

A very complete line of parts, wire and apparatus was displayed by the Shotton Radio Company of Scranton and Albany. They were pushing along the Shramco rheostat, which is made of Nichrome and mounted on asbestos.

Mr. O. Luscomb, president of the Clapp-Eastham Company, and his corps were on the job, giving everyone information on their idea of design and construction. Their apparatus is well known, and they are now introducing a baby knife switch of unique design.

(Continued on page 351)

SIXTH AND SEVENTH DISTRICT AMATEUR STATIONS

CONTINUED

Call	Name	Address	Sparks, Nev.
6ANJ	N. M. Tate		Vacaville, Cal.
6ANK	I. A. Weihe	818 F St.	
6ANL	E. L. Cenner	303 Hopkins St.	Redwood City, Cal.
6ANN	F. J. Elser	Main Street	San Rafael, Cal.
6ANM	E. De Neuf	524 Seventh St.	Petaluma, Cal.
6ANO	W. W. Everett, Jr.		St. Helena, Cal.
6ANP	N. Webster	3240 Lowe Ave.	Fresno, Cal.
6ANQ	H. R. Bradburne	R. 1	Ontario, Cal.
6ANR	J. R. Hubbell	200 Santa Cruz St.	Los Gatos, Cal.
6ANS	D. Rayziff		Merced, Cal.
6ANT	L. H. Sortais	3729 Stockton Ave.	San Diego, Cal.
6ANU	W. T. Wright	4129 Herman St.	San Diego, Cal.
6ANV	C. Champney	422 Vernon St.	Oakland, Cal.
6ANW	A. R. Stanford	175 Eighty-first Ave.	Oakland, Cal.
6ANX	G. S. Parsons		El Cajon, Cal.
6ANY	L. R. Saunders	1206 Stanley St.	Ukiah, Cal.
6ANZ	R. Abrahamson	1351 Webster St.	San Francisco, Cal.
6AOA	Wm. Regalla	217 Cypress Ave.	Stege, Cal.
6AOB	H. G. Taylor	Box 55, National Ave.	Los Gatos, Cal.
6AOC	W. Cutting	67 North First St.	Campbell, Cal.
6AOD	W. Hopson	704 Fifteenth St.	Modesto, Cal.
6AOE	J. H. Chase	1323 Lemon St.	Riverside, Cal.
6AOF	F. B. Tinney	265 Lytton Ave.	Palo Alto, Cal.
6AOG	W. N. Simonds	1129 Sacramento St.	Vallejo, Cal.
6AOH	Wm. Peterson	205 West St.	Sebastopol, Cal.
6AOI	C. Park	P. O. Box 237	Riverbank, Cal.
6AOJ	H. O. Snyder	440 Eddy St.	San Francisco, Cal.
6AOK	G. F. Banks	1648 Neale St.	San Diego, Cal.
6AOL	J. H. Neilson	4003 First St.	San Diego, Cal.
6AOM	J. Chambers	318 Valley St.	San Francisco, Cal.
6AON	Piedmont Boy Scouts	Trp. 1 (port. sta.) Mtn. & Highland Aves.	Piedmont, Cal.
6AOO	F. J. Thiebaut	121 Seventh Ave.	San Francisco, Cal.
6AOP	S. C. Hight	1822 Sixty-third St.	Alameda, Cal.
6AOQ	J. H. Mouthrop	1112 Pacific Ave.	Alameda, Cal.
6AOR	S. Glasson	2319 Ashby Ave.	Berkeley, Cal.
6AOS	W. C. Rodgers	1016 Pacific Ave.	Alameda, Cal.
6AOT	W. T. Mills	R. R. 1, Box 15	Berkeley, Cal.
6AOU	A. Hoefflich, Jr.	521 Anza St.	San Francisco, Cal.
6AOV	E. Minzenmayer	1616 Forty-eighth Ave.	San Francisco, Cal.
6AOW	P. H. Talbot	310 West Second St.	Pomona, Cal.
6AOX	C. Flick	237 North C St.	San Mateo, Cal.
6AOY	J. L. Stevens	Box 1047	Avalon, Cal.
6AOZ	G. M. Sanders	118 North Mill St.	Santa Paula, Cal.
6APA	H. M. Weston	1 Howard St.	Petaluma, Cal.
6APB	W. G. Simms	302 Sycamore St.	Modesto, Cal.
6APC	C. F. Kratz	1529 Fuller Ave.	Los Angeles, Cal.
6APD	M. Fanning	2513 Wellington Road	Los Angeles, Cal.
6APE	L. E. Lane		Willows, Cal.
6APF	W. H. Halabird	1917 Ocean View Ave.	Los Angeles, Cal.
6APG	J. M. Glessner	2637 Piedmont Ave.	Berkeley, Cal. (portable)
6APH	C. C. Young	318 Valley St.	San Francisco, Cal.
6API	F. L. Dewey	450 Divisadero St.	San Francisco, Cal.
6APJ	F. Hall	211 Edgewood Ave.	San Francisco, Cal.
6APK	V. Hall	211 Edgewood Ave.	San Francisco, Cal.
6APL	J. R. Scanlan	513 Fountain Ave.	Pacific Grove, Cal.
6APM	O. Meyers	General Delivery	Linden, Cal.
6APN	F. J. Conlin	517 Virginia St.	Vallejo, Cal.
6APO	L. Bablze	123 East Orange St.	Fullerton, Cal.
6APP	H. Rawls	1258 West Pierce St.	Phoenix, Cal.
6APQ	D. Farran	1044 West Thirtieth St.	Los Angeles, Cal.
6APR	G. H. Taylor		Fall River Mills, Cal.
6APS	H. C. McDonald		Arcata, Cal.

Call	Name	Address
7YF	Burley High School	Burley, Idaho.
7YG	Y. M. C. A.	Portland, Ore.
7YS	Rev. Sebastian Ruth	St. Martin's College
7ZB	J. D. Hertz	Box 878 (Station in Portland)
7ZD	R. E. Dawes	Box 336
7XE	H. P. Sheard	Elk, Wyo.
7ZG	W. E. Slauson	Bear Creek, Mont.
7ZH	O. M. Heacock	Enterprise, Ore.
7ZI	Chas. Austin	1556 E. Taylor St.
7ZJ	E. R. Mumford	518 Beach St.
7ZK	Vernon P. Bird	406 W. Twelfth St.
7LJ	Douglas Dix	Box 151
7LK	Frank P. Bloss	792 East Thirty-fourth St.
7LL	Waverly Miller	1704 East Fourteenth St.
7LM	O. R. Anderson	1114 East Market Street
7LN	Roy Rice	Wanania, Ore.
7LO	B. A. McMahon	5137 Willow St.
7LP	P. W. Dann	Box 974
7LQ	R. A. Gould	Basin, Wyo.

RECENT SIXTH DISTRICT SPECIAL STATIONS

(March 23, 1921)

CZT	Art Johnson, Fair Grounds, Salt Lake City, Utah.
6ZU	L. E. Martin, 100 Olive Avenue, Fresno, Calif.
6ZY	F. G. Roebuck, 333 W. Victoria St., Santa Barbara, Calif.
6ZX	J. V. Wise, P. O. Box 3, Walnut Grove, Calif.
6ZZ	H. L. Gooding, Douglas, Ariz.

U. R. T. A. TO OCCUPY COMFORTABLE QUARTERS

THE Pacific Coast office of the United Radio Telegraphers' Association which has formerly been located at 24 California Street, will be closed and new offices opened at 52 California Street. A large assembly room, containing pool and billiard tables, card tables, writing desks and other conveniences,

will be at the disposal of the members. The new quarters are in the heart of the shipping district of San Francisco and within easy reach of the various offices of radio service companies.

Mr. C. Langevin, local chairman of the U. R. T. A., announces that the membership of the organization is increasing rapidly and the financial condition of the association has been sufficiently good to warrant the expenditure of a large sum of money to thoroughly equip the new assembly rooms. The Masters, Mates and Pilots will occupy rooms on the same floor of the building in which the U. R. T. A. is located.

ADDRESS ERRATA

The correct address of station 6EF is 4421 Mettler Street, Los Angeles, Calif.

RADIO CLUB NEWS

SGT. LUFKIN IS NEW PRESIDENT OF S. F. RADIO CLUB

SGT. W. E. Lufkin, former Chairman of the Pacific Coast Radio Convention Committee, was elected President of the San Francisco Radio Club, Inc., on Thursday, April 8th, and will be installed on April 15th. Mr. C. Thompson was elected Vice-President and Mr. C. Shomaker is the new Treasurer. Mr. Highstone is Sergeant-at-Arms; Mr. R. Lyon is Chief Operator and Mr. G. F. Barry retains the office of Secretary.

Major J. F. Dillon, U. S. Radio Inspector of the 6th Radio District, will install the new officers on April 15th.

MAJOR DILLON SPEAKS AT BAY COUNTIES RADIO CLUB

THE U. S. Radio Inspector addressed the Bay Counties Radio Club on April 9th at the usual weekly meeting of the club. Radio laws and legislation were discussed and a most interesting discussion followed.

On April 1, Mr. Babcock, Chief Electrical Engineer of the Southern Pacific Company, spoke on the use of A. C. for radiophone work. He explained the construction of transformers suitable for that work.

The Club has purchased a Mimeograph for the use of printing the club's monthly paper. A complete radio station is being constructed. It will be one of the most modern in the West.

Mr. B. F. McNamee, President of the Club, will entertain the club members with special radiophone concerts. The address of the Secretary, Mr. R. W. Carroll, has been changed to 444 24th Street, Oakland, Calif. The station call is 6BG.

PALO ALTO RADIO CLUB ELECTS OFFICERS

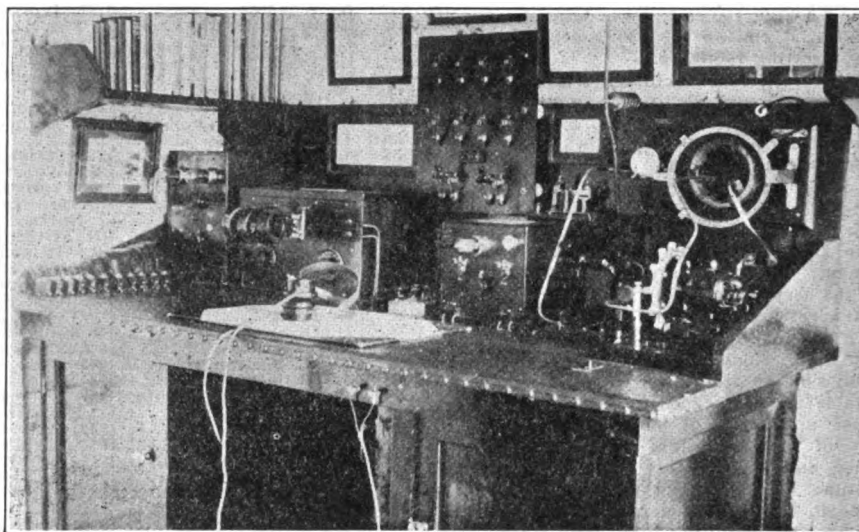
THE following were elected as officers of the Palo Alto Radio Club. President, Hans O. Strom; Vice-President, C. V. Jensen; Secretary, Hatto Tappenbeck; Treasurer, F. W. Kolkman.

The club now meets at 232 Lytton Avenue, Palo Alto. The club rooms will be open at all times to members and experiments of various nature will be performed. A receiving set and remote control transmitter will be installed shortly. Meetings are held every Wednesday evening. Communications should be addressed to the Secretary, 315 Alma Street, Palo Alto.

TACOMA RADIO CLUB HOLDS BANQUET

RADIO men of the Northwest are rejoicing over the success of the banquet and social affair held in Tacoma, several weeks ago. Radio amateurs and commercial men from various cities in the northern state were present and radio conditions in general were discussed. The stations of various club members were visited the following day. President Reichert of the Tacoma Radio Club spoke on amateur co-operation and his address was appreciated by all. Rev. Sebastian Ruth (7YS), Miss Winfred Dow, Mr. and Mrs. "7CB" and many others prominent in the Northwest were present.

3 B V WEST CHESTER, PA.



PAUL U. Watson (3BV) believes that you can't get more out of a station than you put into it. Observe the photo of his station closely and it will be readily seen that everything is arranged in "ship-shape." The entire equipment is home made. Honey-comb and Duolateral coils have been used with much success. The following stations have recently been heard: BZR, NAT, VAL, NDD, NSS, NPL, NBA.

NPZ, NPG, XDA, NGE, NAX, NAR, NAM, NED, NAJ, and many vessels at sea. A regular tuning chart is kept up-to-date by Watson and it is an easy matter to tune to any wavelength by merely consulting the chart. Baldy phones are used. The transmitter is wired with 1/4-inch copper tubing and has done remarkably good work of late.

6 E B -- LOS ANGELES



THE above photographs show the station of Mr. L. F. Seefred, 6EB, Los Angeles, Cal., and the center photo is a good one of the operator. This station is too well known on the Coast to require much comment. Many records have to be added to its credit of late. A short-wave regenerative receiver of the variometer type and a 2-stage amplifier, are doing the trick when it comes to long distance receiving. Everything is home-made, with the exception

of the phones. Baldy's are used by 6BE. All howling has been eliminated from the receiving set but local interference from an uncanny buzz from the power lines has been a detriment to better receiving. On high power 750 watts is used. One turn in the OT primary, .01 MF condenser, 1750 RPM rotary and a 5-amp radiation meter complete the transmitting set.

From the 3 to 4 A. m. a straight gap is used. With the exception of the Dubilier Condenser, the transmitter is home made.

CALLS HEARD BY 6EA (Additional)

Heard: 5IF 6AAT-CW 6ACR 6AGC 6DD
6FJ 6JM 6PG-CW 6ZU 6ZZ and 7FL
Worked: 5ZJ 6AAJ 6AFN 6AID 6AIW
6ALA 6BB 6BX-CW 6IM 6KM 6QS 6VM
KDFU-CW KDPV-CW NRHW-CW and
voice, and "YQ"-CW.

CALLS HEARD AT 6CH

After 11 p. m., from February 1 to April 1
6AGF 6AID 6ACY 6ALX 6ALA 6AJB
6AGU 6AGP 6ABP (6AK) (6CV) 6DP 6DD
6DK 6DR 6EB 6ER (6EA) (6EJ) 6ED (6FH)
6GR 6GP 6GF 6HD 6HH (6IC) 6IS 6IK 6ID
6JJ 6JX 6JD 6KP 6KA 6OQ 6OP (6OW)

6PO 6UQ 1/4PW (6QR) 6SK 6TV 6TL (6TC)
6VL 6XZ (6ZN) 6ZH 6ZY 7AD 7BQ (7BP)
7BC 7BJ (7CC) 7CA 7CI (7CU) 7CW 7DR
7DS 7FL 7FH 7FT (7IN) 7IC 7NN (7ZI)
(7ZJ) 7ZH 7JW 8UE 9WU.

CALLS HEARD DURING MARCH ON GALENA BY FRED W. ADAMS, FLANIGAN, NEV.

6ZN 6ZM 6ZH 6ZQ 6ZR 6ZD 6ZY 6XW
6MN 6MK 6EF 6EJ 6EA 6ER 6DA 6LJ 6LF
6JI 6KI 6OT 6SD 6IV 6ADM 6AJT 6ADM
6ATR 7AD 7BQ 7BC 7BR 7BH 7CB 7CU
7BD 7ED 7FQ 7HR 7NN 7OT 7SF 7WA
7XB 7YA 7YR 7YS 7ZD 7ZJ 7ZK 7ZN 7ZW.

6AHS, SAN DIEGO

Heard the following on a crystal detector:
5ZA 6AD 6AE 6AH 6AK 6BD 6BN 6CO
6CW 6DK 6DP 6EA 6ED 6EN 6ER 6EX
6FE 6FH 6FS 6GI 6GN 6GP 6GT 6HY 6IC
6IF 6IG 6IL 6IM 6JD 6JJ 6JM 6JT 6JR
6KA 6KM 6KP 6LC 6MK 6OH 6OW 6PR
6QR 6RN 6TV 6ZA 6ZC 6ZG 6ZH 6ZK 6ZN
6ZO 6ZR 6ZX 6AAK 6AAW 6ABP 6ACA
6ACM 6ACP 6ADL 6ADX 6AFN 6AFY
6AGF 6AIL.

Calls Heard on One Tube from February 1st to March 30th, 1921, at 6MX, San Francisco

5ZA 6AJ 6AK 6CQ 6DK 6DP 6DX 6EA
6EB 6ED 6EJ 6EN 6FH 6FT 6GP 6GR 6HH
6IM 6IY-CW 6IB 6IC 6JI 6JJ 6JM 6JT 6KA
6KP 6KS 6MA 6MY 6MZ 6OH 6QR 6RN
6SK 6SO 6TC 6TV 6TL 6UO 6VS 6WH 6AZ
6ZX 6ZG 6ZH 6ZN 6AAD 6AAK 6ABM
6ABP 6ACA 6ACF 6ACY 6AOL 6AEI 6AEL
6AGC 6AGF 6AIK 6AIL 6AIW 7AD 7BP
7CN 7CU 7DU 7FZ 7GC 7GQ 7HF 7HN 7ID
7IN 7MY 7YA 7ZI 7ZT.

Calls Heard by 7NG on One Bulb, December 22, 1920, to March 6, 1921

I heard, using one bulb on a regenerative
receiving set of the tickler type, the fol-
lowing stations: 7CC 6AH 6AK 6JM 6GY
6PR 6ER 6RE 6BQ 6OT 6EJ 6AC 6IH 6OH
6SK 6AFN 6FH 6AAR 6AGF 6AAW 6MX
6EX 6IU 6KM 6JJ 6CV 6ACM 6ZR 6ABM
6AJT.

Radio 6EX, Berkeley, Cal. (New List)

5ZA 6BS 6DD 6EK (6ED) (6ER) (6FH)
6HH 6IB (6IC) 6ID 6IG 6II 6IL 6IR 6IS 6IT
6IU 6IV (6IY) 6JJ 6JT (6KA) 6KM 6KS
(6MH) 6MU 6OT (6PO) 6PR 6RE 6RN
(6TL) (6TV) 6UO 6VO 6VY 6WR 6ZA 6ZB
6ZH 6ZM 6ZO (6ZU) 6AAG (6AAK) (6ABP)
6ACD 6ADU 6AEE 6AEI 6AFN (6AFU)
(6AFY) 6ACR 6ABG 6AHU (6AID) 6AIK
6AIO 6ALA 6GI 6GT (6GP) (6TC) (6SK)
(7AD) 7BC (7BJ) 7BH 7BK 7BQ (7BR)
7CC 7CE (7DA) 7DM 7ED 7FI 7FQ 7FY
7GA (7GQ) 7HN 7ID (7IN) 7JF (7JW) 7JX
(7KB) 7LW 7MY 7NN 7QK 7YA 7YS (7ZI)
7ZK 7EX 9LR (6OC?).

List of Calls Heard at 6IV, Riverside, Cal., from March 3rd to March 29

Only those familiar with the conditions in
Riverside can in the least way realize the
difficulty under which radio work is carried
on in Riverside.

6AA 6AE 6AF 6AH 6AK (6AR) 6BX-CW
6CH 6CV 6CZ (6DA) 6DK 6DD 6DL 6DP
6DW 6EA 6ED 6EG 6EJ 6EN-CW and spk
6ER 6EX 6FD 6FH 6GE 6GF 6GI (6GM)
6GP (6GT) 6GY 6HA 6MC (6HG) 6IC 6IF
6IG 6IR (6IS) 6IY-CW 6JM 6JR 6KA 6KL
6KM 6LC (6LI) 6LU 6LX 6LT 6MC 6MK
6NY 6OC 6OH 6OT 6OW 6PJ 6PO (6PR)
6PW 6QR 6RN 6SK 6TC 6TF 6TV (6UK)
6WZ 6XL 6XS 6XZ 6ZA 6ZH 6ZK 6ZM 6ZN
6ZR 6ZU 6ZX 6ZY 6ZZ 6AAAC 6AAG
(6AAH) 6AAT 6AAW 6ACA (6ACG) 6ACR
6ADL 6AFN (6AFW) 6AGF (6AGP) 6AGT
6AHQ (6AIK 6AII 6AIO 6AJP 6AJV 6AJX
6AKH 6AOK (6AOP) 7BP 7BQ 7ED 7IN
7YA 7ZI (CW QRA?) 7ZM (QRA?) 5ZA.

Above heard without any steps of ampli-
fication. Anyone hearing 6IV please QSL.
All acknowledgments answered.

Heard at 7HN, Eugene, Ore., February 1st to March 14th

6AK (6AV) 6AT 6DP 6EA 6EC 6EJ (6ER)
(6FH) 6GF 6GQ 6GY 6HC 6ID 6KM 6MZ
6OC 6OH 6OW 6PQ 6QR 6QS 6TV 6TC 6VX
6ZK 6ZR 6ACA (6ACM) 6AFM 6AFN
(6AGF) 6AID 6AJS 6ALA 6AAD 6AAK 7AD
7BC 7BK 7BQ 7BX 7CC 7CB 7CW 7FI 7FL
7IY 7EG 7LU.

Calls Heard and Worked by C. K. McCor- mick, Santa Cruz, Cal.

Worked: 6DA 6DK 6EA 6EB 6ED 6EK
6EN 6ER 6HH 6HT 6IQ 6KM 6KP 6MK 6OL
6SV 6SK 6TU 6TV 6VX 6ZK 6XZ 6ZN
6AAK 6ABP 6ABW 6ACR 6ACY 6ADL
6AFN 6AGF 6AGM 6AGN 6AGP 6AIK 6AJH
6AJV 7ED 7DS.

Stations heard: 6AE 6AH 6AJ 6AT 6BB
6DA 6DD 6DH 6DK 6FH 6IC 6IF 6JJ 6KA
6MH 6MZ 6OC 6OH 6PA 6QR 6RN 6TC
6ZA 6ZH 6ZM 6ZR 7BP 7BQ 7CC 7CU 7CW
7FH 7IN 7LN 7LW 7ZJ.

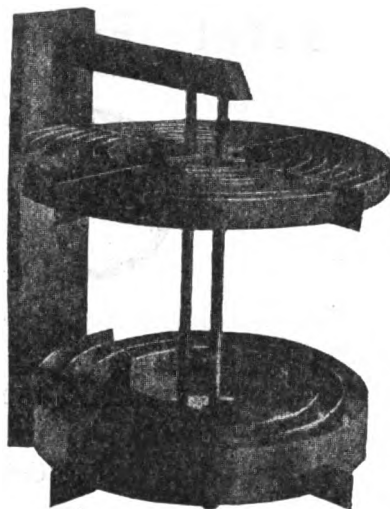
Heard by 6KS 6VL 6ZM 6ACI 7GQ 7YS.
Anyone hearing me, please write.

Heard at 7BP, Portland, Ore., January 1st to March 15, 1921

5ZA (6AE) 6AG (6AH) 6AI 6AJ (6AK)
6AN (6AR) 6AT 6AW 6BB (6CH) 6CO
(6CV) (6DK) (6DP) 6EA (6EB) (6EJ) 6EN
6EP 6ER (6FH) (6FI) 6FJ 6GK 6HH (6HP)
(6JD) 6JI (6JJ) (6JN) 6JR (6KA) (6KL)
6KM 6KP 6LU 6MK 6NO 6JT (6IC) 6IS
(6OC) (6OH) 6OT 6OW (6GF) 6GK (6GR)
(6PM) 6PQ (6PR) 6QM (6QR) (6QS) 6RE
6RQ 6SK 6SR 6TC 6TV 6VM 6WZ 6XZ
6ZA 6ZE (6ZK) (6ZM) 6ZN (6GF) 6GK
(6GR) (6ZO) (6ZR) 6AAW 6ABK 6ABM
6ABP (6ABW) (6ACA) 6ACM 6ACR 6AEA
6AFN 6AFU 6AFY 6AGC 6AGF 6AID 6AIW
(6ACD) 6AJT 6ALA (7AD) 7AS (7BC) 7BG
(7BH) (7BK) (7BQ) (7CA) 7CB (7CC)
(7C...) (7CW) 7EX 7-F 7FL 7-T 7GY (7HE)
(7IN) 7JR 7JX (7LN) 7LU 7NL (7NN) 7FB
(7YA) (7YS) 7ZG 7ZH 9LR 9OE 9.A.

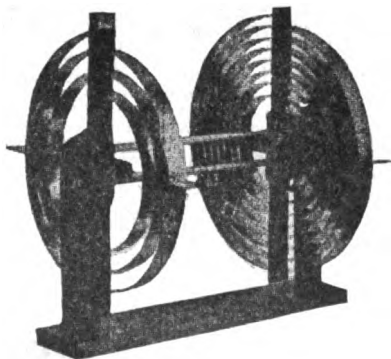
T RADIO H

Oscillation Transformer



Type TH-2

An Oscillation Transformer for the modern amateur must be pleasing in appearance, must not be too expensive, and above all, it must be efficient. The "T & H" Transformer, the first of a series of radio instruments to be placed on the amateur market, truly fulfills all of these requirements. All woodwork is of walnut, finished a dull natural, blends well with either mahogany or oak instruments that may comprise any other apparatus in the station. The supports are of heavy formica slotted to receive the ribbon of polished brass. There are eight complete turns of 1 1/4 inch ribbon on the secondary, while the primary is made with either 1 1/4 inch (Type TH-1) or with 3 inch (Type TH-2) ribbon, and has 3 turns. Coupling between the two windings may be as much as 12 inches.



Type TH-1

The instrument may be mounted on the table top in a horizontal position or fastened to the wall or other vertical object, with one coil above the other, as illustration above.

Consistent long-distant transmission is the desire of every amateur. To accomplish this with low power and short wave-length allowed by the government, no energy must be lost. A feature of the "T & H" Oscillation Transformer is that there are no metal parts near the windings to absorb the energy that is so valuable, nor is there appreciable resistance losses, because of the large surface of the ribbon. Diameter of windings, 18 inches.

TYPE TH-1 \$14.50
TYPE TH-2 \$18.50

COMPLETE STOCK RADIO DEALERS WANTED

T & H Radio Co. ANTHONY, KANSAS

RADIO CLUB DIRECTORY

Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts. San Francisco, Calif. Meetings every Thursday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary.

—adv.



Interpanel Sets

The Most Advanced Idea in Radio Telephone Transmitting and Receiving Apparatus

THE DeForest RADIOPHONE INTER-PANEL Set establishes a new standard of design and efficiency for DeForest Apparatus, and provides the most convenient and all 'round satisfactory method of purchasing Radio Apparatus yet invented.

The INTERPANEL Set consists of a series of panels, each constituting a complete piece of apparatus in itself, and designed to be combined with other panels, thus forming a Set complete as may be desired, the operating possibilities depending only upon the total number of panels used. The Set for both Telephone and Telegraph transmission and reception consists of four panels as follows:

Type MT-100—A complete short wave Tuner of highest possible efficiency;

Type MP-100—A new Audion Control panel designed especially for tubes of the gaseous type, now considered as standard;

Type MP-200—A one-step Amplifier panel complete in every respect; and

Type OT-3—A complete Radiophone Transmitter, capable of transmitting speech at least 30 miles, and up to 500 miles.

(Additional steps of amplification may be added as desired).

Panels are all 9 inches high; varying widths. Designed for placing side by side, with binding posts in line and convenient to wire. Adaptable to any operating requirement. Panels may be bought individually and mounted in operator's own cabinet; or bought completely mounted in cabinet. Or panels alone may be mounted on table in either horizontal or vertical style.

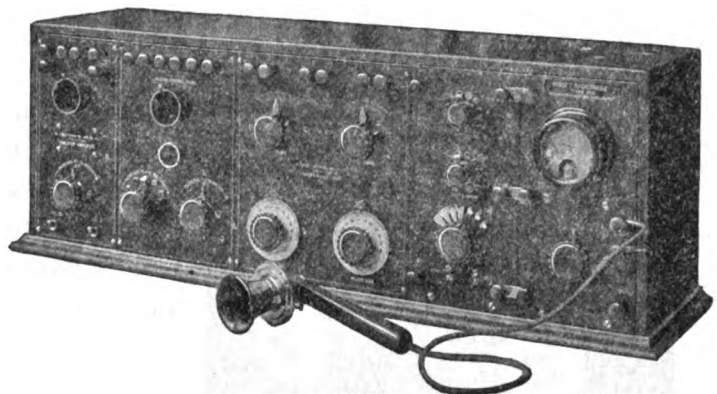


Vertical Panel-style mounting, without cabinet. Two legs hold each panel upright. Any number of panels may be joined and mounted this way.

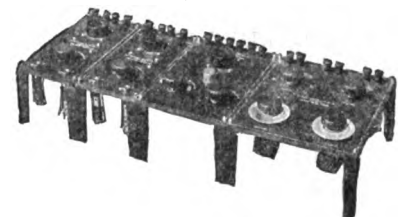
30 Mile Range for the Telephone Transmitter on Average Amateur Aerial

Tests show a 30-mile telephone transmitting range for the Set, which can be exceeded under favorable conditions. Telegraph range from 60 to 100 miles with unlimited reception possibilities. One 6-volt storage battery required for all filaments and microphone; Motor-generator, "B" Battery or rectifier supply may be used.

The INTERPANEL Set provides the ultimate in RADIOPHONE apparatus; ease and convenience in installation and operation; minimum space, handsome appearance, great efficiency and extreme economy.



Complete Set of Four Units, in cabinet. Each panel sold separately for mounting in home constructed cabinet; or completely assembled in cabinet as shown above. Also for mounting in Horizontal or Vertical Table-style. Complete Set as above, without batteries or tubes; type MS-1; \$189.25.



Horizontal Table-style mounting. Legs attached to corners of each panel. Any number of panels can be mounted in this style. Ample space under panels for batteries. A very convenient and inexpensive method of mounting.

Send Now For Catalogue "E" and Prices

Get the full details of this new INTERPANEL idea, and get your order placed early.

DeForest Radio Telephone and Telegraph Company

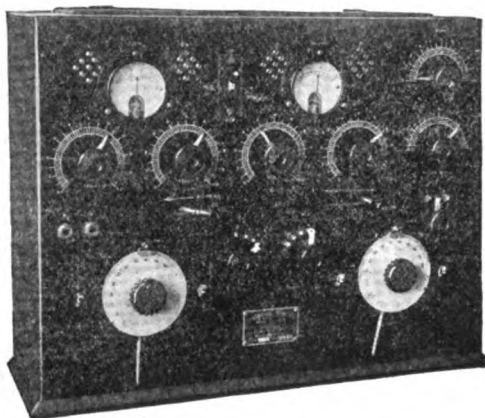
Inventors and Manufacturers of High Grade Radio Apparatus

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NEW YORK CITY

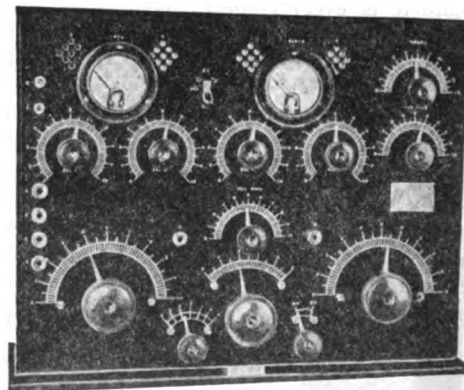
ARE YOU IN THE CLASS

of discriminating purchasers who keep quality foremost in their selections? If so, the two new receivers shown below are of interest to you



The Altaceiver, type CW-3 comprises a long wave damped or undamped wave receptor combined with a detector and three step audio-frequency amplifier. Inside tube mounting, potentiometer plate battery control, separate filament battery control, detector plate and filament circuit meters, vernier tuning adjustment and undistorted amplification are among its many special features. Used by the Chicago Tribune in copying foreign press despatches.

The Multiceiver, type MC-3 combines a short-wave regenerative receiver of the tuned tertiary type and of extreme efficiency, with a detector and three-step audio-frequency amplifier. Delicate plate and filament potential control, detector plate and filament meters, inside tube mounting, special battery-control, transmitting-receiving switch, antenna series condenser, and special amplifying transformers are provided. Provision made for addition of external loaders or use of external tuner and detector by means of simple plug and jack.



Our new Catalog F-21 describes these sets in detail. Write for it!

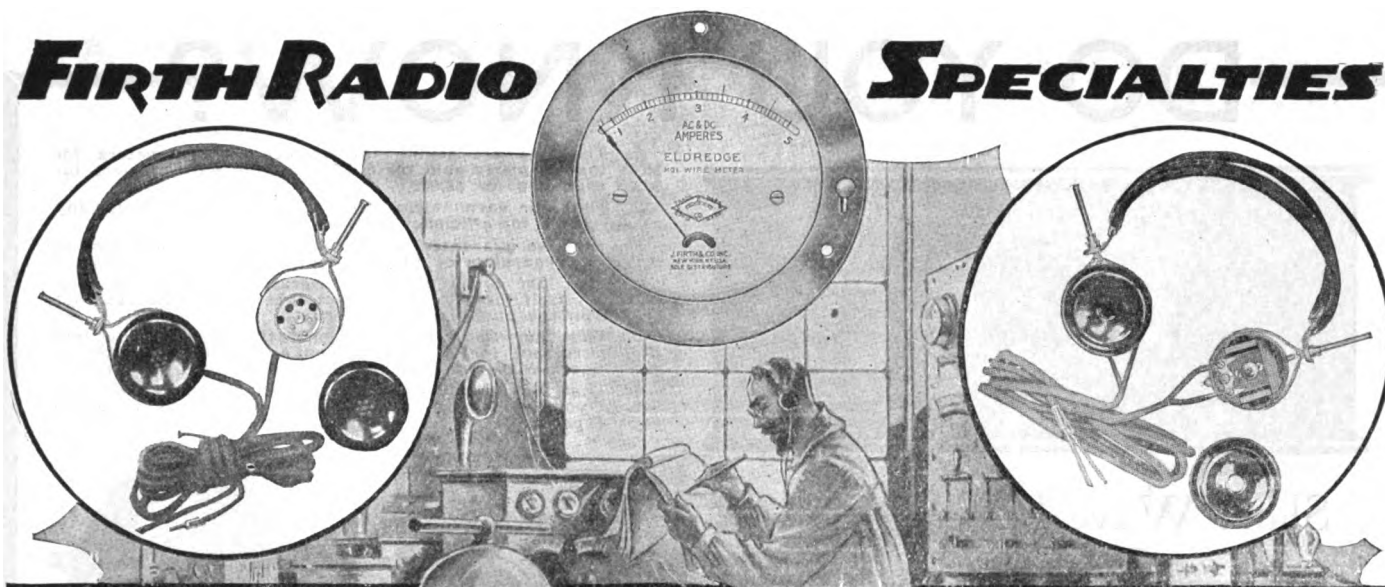
All our prices have been reduced! F-21 quotes new prices

CHICAGO RADIO LABORATORY

(New Address) 6433 RAVENSWOOD AVE.

Testing Station: 9ZN, 5525 SHERIDAN ROAD

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FIRTH RADIO**SPECIALTIES****BALDY PHONES**

Set new world's record. Used in the trans-continental relay, Jan. 18, and highly praised by operators participating in the test. Used by H. D. Selvage in his 3300 mile trans-continental reception.

For "transcontinental" results, you too, should use Baldy Genuine Mica Diaphragm Phones, equal to two stages of radio amplification.

Original Type "C".....\$16.50
Improved Type "E".....20.00

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Individually engraved and hand-calibrated. Famous for 25 years for their unvarying accuracy.

Hot wire ammeters (Model shown)
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Model S-D Ammeters and Volmeters:
Specially designed for 60 cycle
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BROWNLIE PHONES

Unquestionably the most sensitive metal-diaphragm phones in existence. Instantly adjustable to changes in signal strength and pitch. You not only match the units with each other, but actually with the desired signal. Rugged, light weight, equipped with Baldwin self-adjusting, comfortable headbands.

One model, Price \$12.50 complete

NORTHWESTERN RADIO—A New and Improved Line of Receiving Apparatus



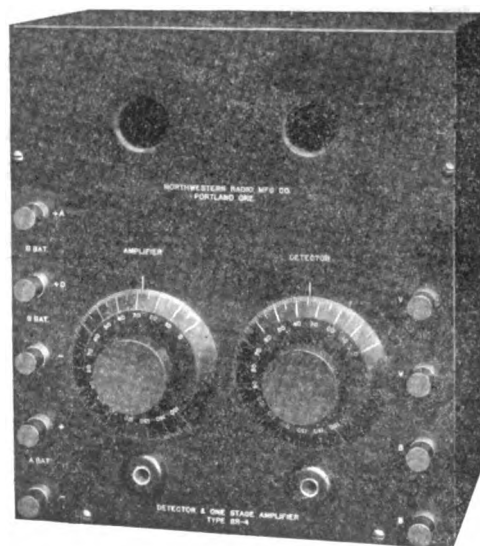
Detector Unit Type SR3. Size of Panel 10½x5½. Complete, less tubes and battery.
\$20 f.o.b. Portland

These illustrations show two more of our complete line of receiving instruments—our Detector, and our Detector and One-Stage Amplifier.

These instruments are of the finest materials and workmanship.

Panels are of quarter-inch grade XX Bakelite. The engraving is done with Gorton Pantagraph engraving machine. Cabinets are of oak, flemish oak finish.

Knobs and dials are turned from sheet Bakelite.



Detector and one-stage Amplifier, Type SR4. Size of Panel 10½x9½. Complete, less tubes and battery. \$46 f.o.b. Portland.

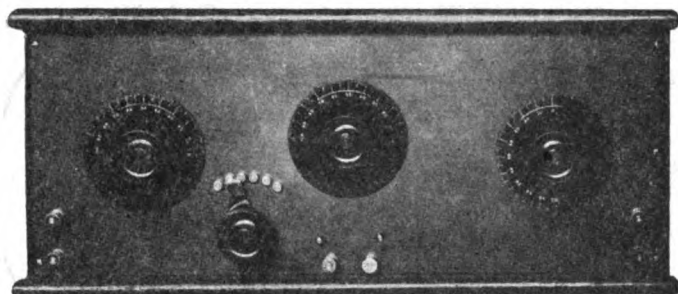
Write for illustrated Catalog, prices and our Guarantee

NORTHWESTERN RADIO MANUFACTURING CO.

1556 EAST TAYLOR STREET

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DO YOU KNOW?



Short Wave Regenerative Receiver

THE AVERAGE AMATEUR is not aware of the wide range of variations and possibilities of this receiver. It is constructed of the best material throughout. Grained Formica panel. Cabinet in Teak or Oak, beautifully finished. 16 in. long, 7 in. high and 7 in. wide. Dials and knobs are of bakelite, white engraved. Switch—six points for primary.

Our Rock Bottom Price, Prepaid - \$37.50

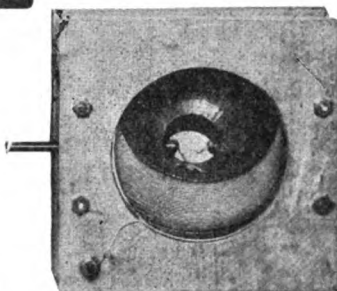
DEALERS: WRITE US FOR PROPOSITION

McGUIRE RADIO LABORATORY

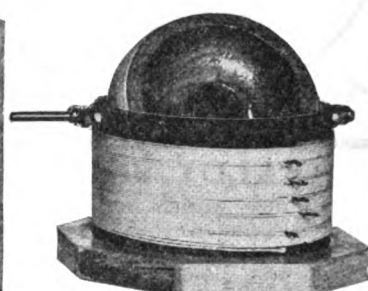
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1855 CHURCH STREET

1. That we are selling the variety of variometers for \$5.25 that formerly sold for \$10.00 and the variocouplers for \$4.25 that sold for \$8.00.
2. That our variometers and variocouplers will equal any at any price for efficiency and workmanship.
3. That we guarantee the windings on our variometers to stay put, regardless of climatic conditions.
4. That our Short-Wave Regenerative Receiver is in a class by itself for price. The fact that it is cheap does not reflect on the quality and efficiency.
5. That our Short-Wave Regenerative Receiver is just the instrument for C.W. reception and performs better in some cases with one-step of amplification than with two.
6. That we do not want dissatisfied customers and will refund your money on any order that does not come up to your expectation.



Our Type V-1 Variometer is a thoroughly efficient instrument. It has positive contact bearings and we guarantee that the windings will stay put regardless of climatic conditions. Our price, postpaid, \$5.25. Size: 5"x5"x2 3/4". Has 3/16" shaft.



Our Type C-1 Variocoupler. Mounted on hardwood base. Positive spring contact. Dimensions: 6 in. wide, 5 in. high. Has 3/16 in. shaft. **OUR LOW DOWN PRICE, PREPAID\$4.25**

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CW Inductance, \$5.00.
Threaded Tube, \$3.75.
Bakelite Tube only, \$2.20.

The Answer **CW** To QRM

"Standard" C W apparatus is designed and constructed in accordance with the latest engineering practice. If you want efficiency and results use "Standard" products.

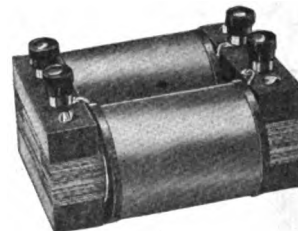
Get your copy of price sheet now.

Standard Radio Company

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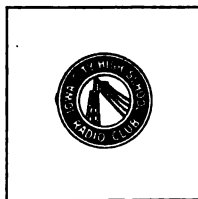
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Three Henry Double Coil Choke, \$7.50.

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A Real Advance! 150-3,000 Meters

We feel proud of the fact that we were the first manufacturer to adapt the Armstrong Regenerative Circuit to a receiver having a wave-length range of 150-3000 Meters.

We are even more proud of the efficient manner in which the



Type CR-5 Regenerative Receiver



performs at any wave-length within these limits.

Included in its range are amateur, commercial and Navy wave-lengths, special land stations, ship CW stations, Navy low-wave arcs, all radio phone work and "Time."

Its ease of operation is unparalleled. It is a **complete** receiver—the only additional equipment needed are phones, batteries, and a detector tube.

See it at your dealer's today.

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Holt Electric Utilities Co., Jacksonville, Fla.
Hurlburt Still Electrical Co., Houston, Texas.
Kelly & Phillips, Brooklyn, N. Y.

Klaus Radio Company, Eureka, Ill.
Manhattan Electrical Supply Co., New York, Chicago, St. Louis.
Leo. J. Meyberg Co., San Francisco, Cal.
J. H. Bunnell & Co., New York City.
F. D. Pitts Co., Inc., Boston, Mass.
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Distributors of Reliable Radio Apparatus to Schools, Colleges, and Experimenters all over the world.



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No. 166A Gen. Radio, unmounted....\$4.50
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No. LC-101 with gears and base....\$12.00
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and primary switch.....13.00
No. LC-100 with gears but no base. 9.00

CONDENSERS (Variable)

No. F-800 .0006 Clapp Eastham Bal.\$7.50
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No. ES-335 1 MF 500 Volts.....\$1.25
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A.C. 2.50

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No. CR-1 Grebe 175-680 Meters.....\$90.00
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175-680 Meters65.00
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No. CR-6 Grebe 175-680 M. Det. and
2-step amplifier.....200.00

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"Long wave Especial".....\$210.00

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Baldwins Type C, Navy Standard..\$16.50
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tive"20.00
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No. UV-200 Radiotron detector....\$5.00
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(These are the Radio Corp's new tubes)

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No. D-100 250 W. 10,000 V. .007 mf..\$19.00
No. D-101 500 W. 14,000 V. .007 mf. 30.00
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No. 443 Murdock, 3-16, ¼ or 5-16"
shaft\$3.00
No. T-1 Thordarson 8 to 16 pt..... 6.00
No. R-1 Benwood 8, 10 or 14 pt..... 8.00
No. H-1 Hyrad 10 point, 9ZN type..10.50

QUENCHED GAPS

No. G-1 Amrad 1 K.W. Size.....\$41.50
No. G-2 Amrad ¼ K.W. Size.....24.50
No. G-3 Amrad ¼ K.W. Size.....12.00

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No. F-1 Acme 500 Watt with Bake-
lite panel, completely mounted.\$30.00
No. H-1 Acme 1000 Watt with bake-
lite panel, completely mounted..45.00
No. P-1 Thordarson, 250 Watt Type
"R" old model.....15.00
No. P-2 Thordarson 500 Watt Type
"R"24.00
No. P-3 Thordarson 1000 Watt Type
"R"39.00
Note—These Thordarson transformers
are splendid values at above prices.

CW INDUCTANCES

Type 181 Tuska\$7.50
Type 181A Tuska, K.W. type..... 5.00
Type 182 Tuska (Magnetic type).....10.00
Type 183 Tuska (Tickler type).....12.50
Type 170 Tuska Filter16.00

CW TRANSFORMERS (Phone Work)

Acme 200 Watt, mounted\$20.00
Acme 200 Watt unmounted.....16.00
Acme 50 Watt mounted15.00
Acme 50 Watt unmounted.....12.00

CHOKE COILS (Phone work)

Acme 1½ Henry 500 MA double coil.\$8.00
Acme 1½ Henry 500 MA single coil 6.00
Acme 1½ Henry 150 MA double coil 6.00
Acme 1½ Henry 150 MA single coil 4.00

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Tuition ten dollars a month for either the day or evening sessions or both combined.

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"The Radio Telegrapher"

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UNITED RADIO TELEGRAPHERS' ASSOCIATION

Room 303
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Read about what's going on among the Commercial, Navy and Army operators

**ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD**

Subscription Price \$1.50 yearly, 15 cents a copy

Tresco Ten \$ Tuners

When you think of tuners say TRESKO.
One for every need and wave length.

Presume you would like to hear something of the luck I have had with your "TRESKO tuner", which I bought of you some time ago. I am more than pleased with it. If I could not get another, I wouldn't take a hundred dollars for it, and it is certainly the best tuner I have ever used. All stations of from 4,000 to 20,000 meters come in loud and strong, and without amplifier. Another feature is, that it will work right through static, with a little adjustment. Since owning this Tuner, I haven't "closed up" on account of static.

J. B. ELLIS, Rancho De Casa Loma, Cochise, Arizona.

CATALOG FREE

TRESKO,

Davenport, Iowa



Pat. Applied For.

REMLER No. 93 A-BATTERY POTENTIOMETER

Increases detector sensitiveness and signal audibility.

The plate voltage of any detector tube must be carefully adjusted for maximum sensitiveness and signal audibility. Potentiometer control provides close adjustment with ease of operation. This Remler Unit is not brittle and is connected across the A-Battery to control the plate potential over a six volt range by half-volt steps. Circuit diagram furnished with each unit.

No. 93—Remler A-Battery Potentiometer Unit only with studs for panel mounting **.75**

No. 94—Remler Rotary Lever Switch for use with No. 93 Unit **.45**

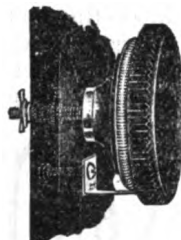
Complete 200-page catalogue will be sent upon receipt of 35c.

This amount refunded with first purchase of \$1.50 or over

LEO. J. MEYBERG CO.

(Successors to Haller Cunningham Electric Co.)
428 MARKET STREET SAN FRANCISCO, CAL.

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PARKIN RHEOSAT

5000 SOLD LAST YEAR
AT \$1.00

Now reduced to

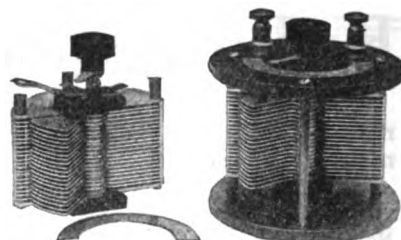
75c

Due to the general drop in the prices of raw material and to our large production, we have been able to reduce all our prices to their pre-war level, and in some cases even lower. New catalog No. 3, listing our complete line sent free. Here are a few of the items:

No.	Postpaid
31. Audion panel with rheostat or B Battery Switch.....	\$8.00
43. 45-volt large B Battery.....	5.00
50. PARKIN .001 mf. variable condenser, unit only.....	1.50
51. PARKIN .001 mf. V.C. with knob and pointer.....	2.00
52. PARKIN .001 mf. V.C. with knob and 3 in. dial.....	2.50
53. PARKIN molded bakelite fixed condenser	0.70
U. V. 200 Radiotron Vacuum tube..	5.00

DEALERS—If you are not on our mailing list write for new catalog and discounts

PARKIN MANUFACTURING CO.
San Rafael, Cal.



THE "ILLINOIS" VARIABLE CONDENSER

The Condenser with "Star Spring" Tension

MADE RIGHT - STAYS RIGHT
Hard Rolled Aluminum Plates

These condensers are made by a watch mechanic, schooled in accurate workmanship and who can't get over the habit of critical inspection.

Three Styles: No. 1, Panel; No. 2 Open Type as shown; No. 3, Fully Encased. Anti-Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No. 1	No. 2	No. 3
67 Plates	\$7.00	\$	\$
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured P.P. With Style No. 1, we will, if desired, furnish 3 inch Dial with large knob, instead of Scale and Pointer. Extra Price 75 cents.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

Kindly note: We issue no Catalog, and make no "trade discounts." We set our prices at the lowest limit, and leave the "middle man" out for the sole benefit of the "consumer."

G. F. JOHNSON
625 Black Avenue Springfield, Ill.

PARKIN MFG. CO. ISSUES NEW CATALOG

M R. John Parkin, Manager of the Parkin Mfg. Co., of San Rafael, has taken the lead in bringing down the price of radio apparatus to what it was some years ago. The new Parkin catalog is now ready and contains many material reductions in the price of apparatus manufactured by the Company.

WIRELESS ENDANGERING JOBS OF MUSICIANS

THE wireless telephone concerts which are caught daily by 600 amateur operators in this city and about the bay have drawn the fire of the San Francisco Musicians' Union, according to a

story told at a demonstration concert during a Commonwealth Club luncheon at the Palace. Complaint has been made that union musicians are being deprived of a living by amateur operators "sneaking" the music sent from the California Theatre apparatus to ships at sea during afternoon and evening performances. The canny telephone brigands are furnishing the music to dance parties, so the complaint goes. The story was told by Lieutenant Ellery W. Stone, general manager of the Moorhead Laboratories of this city, manufacturing the radio telephonic equipment. He predicted that wireless telephones will some day be a part of the ordinary equipment of the home.

TRANSFORMERS

The new "Puget" transformer is now ready. Don't be misled by ads for low voltage transformers. The "Puget" is resonant and puts the most energy into your condenser. The ½ K.W. far outclasses 1 K.W.'s of other makes.

500 Watt Size.....\$26.75

25,000 volts

GIVES A CLEAR NOTE ON AMRAD GAPS

AMPLIFIERS

1 Step Panel, \$18.00; 1 Step in Cabinet, \$22.00; 2-step in cabinet, \$45.00. Full line of Amrad, DeForest, Radisco, Murdock, Etc.

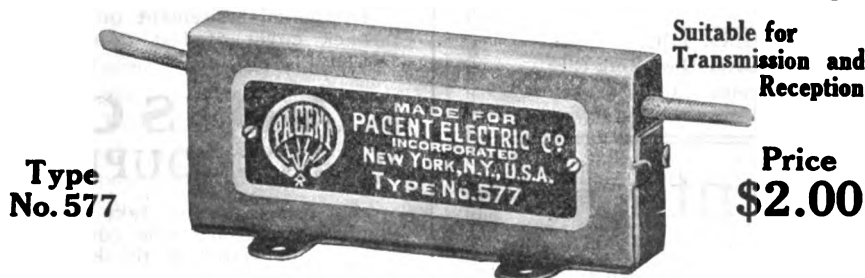
Fast Mail Order Service

Northwest Radio Service Co.

609 FOURTH AVENUE

SEATTLE, WASH.

Introducing The Dubilier Universal Condenser



Will handle 100 watts of C. W. energy.

THE DUBILIER UNIVERSAL CONDENSER is the first condenser especially designed for low power continuous wave transmitters which will also prove suitable for reception work. This condenser is made of the finest clear India Mica. Its capacity is absolutely constant and is so maintained by special spring clamps which slide on the pressure plates. This unique construction permits an extremely compact unit and the losses are so small as to be immeasurable. They are tested at 1500 volts and rated at 1000 volts so that they can be used on C. W. sets up to and including 100 watts.

The No. 577 DUBILIER UNIVERSAL CONDENSER can be supplied in practically all capacities at \$2.00 each.

Bulletin D2 describing the DUBILIER UNIVERSAL CONDENSER, together with literature describing other high grade apparatus will be sent you on receipt of five cents in stamps.

DEALERS—Write immediately for our liberal discounts.

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Wicony's Complete Line of "Eventual" Apparatus.
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PACENT ELECTRIC COMPANY, INC.

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Didn't You Know?

WE supposed everybody knew that any apparatus ordered from Corwin Mail Order Service was **guaranteed**—to be shipped at once—to arrive in perfect condition—and to give **complete satisfaction**.

If you didn't know that, now go ahead and order from Corwin with perfect confidence.

New Radisco Coupler—

The vario-coupler that's "accurate to the .002 part of an inch." Moulded base, Formica tube. Brass for all metal parts.

Price \$7.50, postpaid

Universal Coil-Mounting Plugs—

Anyone can easily make smooth-running mountings with these plugs. Exceedingly accurate. Made to fit Radisco and all hand wound coils.

Price 50 cents, postpaid

VACUUM TUBES

Electron Relays\$6.00
VT Amplifier, (1 lb.) 7.00
VT Extra Hard for transmitting... 7.50

VARIABLE CONDENSERS

A. R. Co. .001.....\$6.35
A. R. Co. .0005..... 5.00
With No. 67 Dial add \$1.00

Murdock 366\$4.75
Murdock 367 4.75
Murdock 368 3.75
Clapp-Eastham 800 7.50
Clapp-Eastham 800A 9.50
Clapp-Eastham 800B11.50

Complete with dial

Shipping weight One Pound.

GRID CONDENSERS

Radisco, Postage 3 cents.....35c

ANTENNA SWITCHES

Murdock, 3 lbs.....\$4.50
Clapp-Eastham, 10 lbs.....12.50

OSCILLATION TRANSFORMERS

Murdock No. 424 (5 lbs.).....\$5.00

RADIO CRAFT PRODUCTS

Detector\$15.00
Two step Amplifier 50.00
Detector and 1 step..... 45.00
Detector and 2 step..... 70.00
Postage paid

"B" BATTERIES

Radisco No. 1, 2 lbs.....\$1.50
Radisco No. 5, 5 lbs..... 2.65
Eveready Storage battery prices on application

TUSKA C. W. APPARATUS

181 Coil, 2 lbs.\$ 7.50
182 Coil, 2 lbs. 10.00
183 Coil, 3 lbs. 12.50
170 Filtr., 8 lbs. 18.00

AMPLIFYING TRANSFORMERS

A.R. Co., 1 lb.....\$5.00
Federal, 1 lb..... 7.50

JACKS AND PLUGS

Federal Closed Circuit 85c
Federal Open Circuit 70c
Federal Double Circuit.....\$1.00
Federal Plug 2.00
Postpaid

ALL RADISCO COILS and Wireless Press Books.

ROTARY SWITCHES

Clapp-Eastham, No. 19.....\$1.00
Clapp-Eastham, No. 19A..... .35
Our Own, No. 1..... .40
Our Own, No. 2..... .55
Postage 5 cents.

CORWIN DIALS

No. 66, 3"\$.75
No. 67, 3" with knob 1.30
No. 68, 3 ¼" 1.00
No. 69, 3 ¼" with knob..... 1.70
Postage paid.

RECEIVERS

Murdock No. 55, 2000 ohm.....\$4.50
Murdock, No. 55, 3000 ohm..... 5.50
Brandes Superior 7.00
Baldwin C16.50
Baldwin E, improved.....20.00
Brownlie, New12.50

Shipping weight, 2 pounds

All orders for apparatus not listed as postpaid must be accompanied by postage charges.

A. H. CORWIN & COMPANY

Dept. G6. 4 West Park St., Newark, N. J.

VACUUM TUBES REPAIRED

RELIABLE SERVICE TO THE RADIO AMATEUR

MARCONI VT's, MOORHEAD VT's, **\$3.50**
ELECTRON RELAYS

CASH MUST ACCOMPANY ALL ORDERS

Eastern Vacuum Tube Laboratories

178 Washington St.

Boston, 9, Mass.

DIALS

Can you beat a dial four and three thirty seconds of an inch in diameter, of No. 16 Gauge Hard Brass, figures and scale divisions in black enamel and etched in, surface silver plated and lacquered, scale 0 to 100 clockwise, on one half, three concentric circles on the other half, like a Navy Dial, only better.

PRICE \$2.00

Postpaid in the U. S.

Efficient Radio Apparatus Shop

BOX 662

DAYTON, OHIO

SOMETHING NEW IN HEADSETS



"Navy Type, 50,000 Ohms, A. C., Weight 9 oz., complete with head band and polarity indicating cord.
Price \$14.00

Send 5c for Catalog "C"

With recent improvements in our Navy Type Headset we have succeeded in bringing out a headset with an A. C. resistance of 50,000 ohms at 800 cycles, a thing which has never before been accomplished in a commercial headset. It has a natural high pitch and will bring in thousand cycle notes clearly and distinctly and undamped waves can be read clearly and distinctly through static.

The improved Navy is peculiarly adapted to vacuum tube reception.

They are permanently adjusted at their highest point of efficiency and then carefully matched in tone. Because of their rugged construction they remain adjusted indefinitely.

The most exacting comparative tests have convinced us that our High Impedance Navy Type Headset is the best on the market, regardless of price. It is the most sensitive, most durable, and at the same time the lightest high-grade headset built. Our guarantee stands back of every one of these claims.

If you need a reliable and super-sensitive headset, you cannot afford to be without this new high impedance model. Send us \$14 and we will mail you a Navy Type Headset. Try it for 10 days. If you are not absolutely satisfied with your purchase, return the headset and we will refund the money immediately.

C. BRANDES, Inc.

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Also makers of: Trans-Atlantic Headsets, \$12.00.

Superior Headsets, \$8.00.

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New Developments, C.W. Transmission, Vacuum Tube Circuits, Regenerative Receivers, Underground and Loop Antennas, Radiotelephony, Relaying, Operating Department Work, all A.R.R.L. News, Humorous Stories by The Old Man. All these and many more are included in QST.

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AND MAIL IT TODAY!**

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Hartford, Conn.

Enclosed find \$1; please enter my trial subscription to QST for 7 months.

Name _____

Address _____

BRASS SWITCH CONTACT POINTS

Size, 7/32x7/32

Price with 1/4-inch screw \$0.20 doz.

Price with shank and brass nut .30 doz.

Price of extra nuts for same... .10 doz.

Add Postage

Order from Ad Satisfaction Guaranteed

Immediate Delivery—Try us

STRATTON ELECTRIC COMPANY

215 Federal St. GREENFIELD, MASS.

Correction Notice

In the advertisement on the back cover of last month's issue, for the new

RADISCO VARIO-COUPLER

the price, in the text was given as \$6.50. The correct price, as stated in the headline, is

\$7.50

This is an exceptionally reasonable price for an instrument of such high quality, as you will see by examining it at any of the dealers listed on the back cover.

RADIO DISTRIBUTING CO.

Newark

New Jersey

Announcement

OWING to the increased popularity of CW transmission and the increasing demand for Ray-Di-Co motor generator units it has been necessary to open a Western point of distribution. The territory consisting of the states of Colorado, Wyoming, Utah, Nebraska, western Kansas, northern New Mexico, Deadwood and Lead, South Dakota, will in the future be cared for by H. H. Buckwalter, 713 Lincoln Street, Denver, Colo. Mr. Buckwalter is a well-known radio man in this territory has a large personal acquaintance with the amateur and will shortly have a stock of the "MIDGET", "HYLO" and "STANDARD" motor generator units in stock for immediate shipment. Later it is hoped he will have a stock on hand which will care for shipments to dealers throughout the entire west. Just another step by Ray-Di-Co to give the amateur better service and attention. Mr. Buckwalter will be glad to render any assistance possible to the amateurs in his territory.

RAY-DI-CO 2653 N. Clark St.
CHICAGO, ILLS.

When writing to Advertisers please mention this Magazine

ARCHIBALD AUGUSTAS GETS A SCARE

(Continued from page 333)

There was an ominous silence.

The judge regarded the prisoner with an angry glare. Before he could speak, however, there was a violent commotion outside, and a moment later a puffing and perspiring person came rushing undignifiedly into the courtroom. Catching sight of the mysterious prisoner, he stopped and seemed to stagger.

"Good Lord!" he groaned, putting his hand to his head, "You're a sweet-looking sight, all right, all right!"

"How in heck did you find out I was here?" demanded the black-faced enigma.

"How did I find out!" barked the other, mopping the sweat and dust from his face with his handkerchief. "When you didn't show up this morning, and when I saw that hell-fired gang of young hyenas acting so blamed queer and snickering up their sleeves like they were, I knew blasted good and well something was rotten in Denmark: finally I got Kid Brady by the back of the neck and laid him out on a practice-table and sat on him until he spit out the truth. Then I breezed down to the inspector's office, where I found that old sister to a fire-wagon siren babbling something about a black monster, and right away I knew what'd happened, so I rambled up here, —and when it comes to a twenty-four carat, double-barreled damn fool, you take the prize—!"

"Here, here!" yapped the judge, hanging on his desk with his mallet. "What does all this mean, anyway?"

"Excuse me, Your Honor," answered the new-comer, turning to the judge, "I'm the instructor at the wireless school down on Main Street, and this poor, ignorant, addle-brained image of a countrified jackass is one of my pupils. That gang of criminals down at the school found out he was pretty shy on cash and in a hurry to get a license so he can get a ship; and so they talked him into this confounded crack-brained scheme. They bought the clothes and the nigger-paint, and early this morning they went up to where he rooms and dolled him up. The idea was to take the license examination in disguise, and if he passed all right, to come back in a few days without the coon-town outfit and take the ex over again in his own name. Why that cursed crowd of young ourang-utans made him believe it was a surefire stunt that'd been pulled a dozen times before and—but, Lord, I wish somebody'd tell me what they'll do next, blast em!"—and Pop Cranby mopped his face again.

The crowds in the courtroom were amazed.

"Where did you get that story about the Chilean ship?" demanded the judge of the youthful prisoner.

"The fellows picked it out of a dime novel fer me."

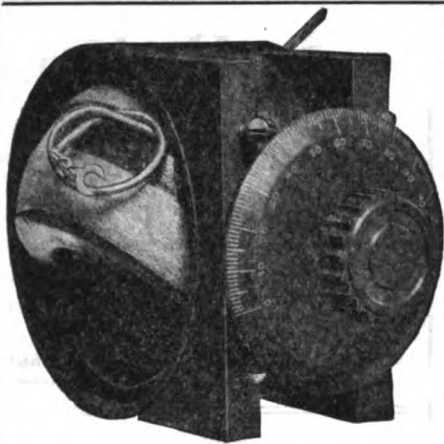
"Holy Mackerell!" groaned Pop Cranby.

Archibald Augustas cleared his throat. His face had become dignified and stern.

"This is outrageous, Your Honor," he began, in his coldest secretary-of-the-navy tone. "It is evident that this person has dangerous criminal tendencies. I suggest that he be sentenced to at least twelve months at hard labor."

Right here, Archibald Augustas overstepped himself. Had he remained silent, things might have gone hard with the adventurous amateur, but the assistant

(Continued on page 350)

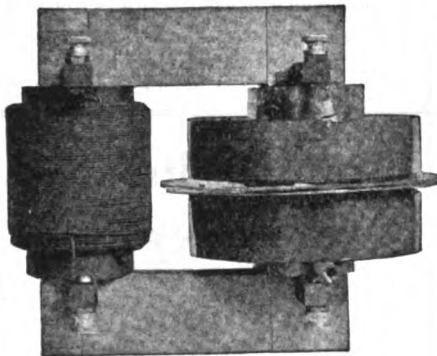


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps.



CORWIN DIALS

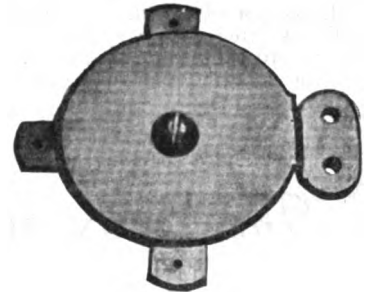
Judged by time, Corwin Dials are the oldest on the market; judged by design, they are the newest; judged by performance, they are the most satisfactory; and judged by price, they are the best value obtainable.

3" Dial, 75c—with knob, \$1.30
3 3/4" Dial, \$1.00—with knob, \$1.70

At all Radisco agencies,
and other reliable dealers,
or sent postpaid anywhere

A. H. CORWIN & CO.
4 West Park St., Newark, N. J.

MICA GRID CONDENSER



SCRAP your old-fashioned paper condenser. Put in an ABC genuine mica grid condenser. The Navy barred paper in favor of mica years ago!

The mica condenser shown cuts dielectric loss to a minimum. Besides, it gives you 3 capacities—an exclusive feature. Yet the price is only

75 cents postpaid

It's an ABC Standardized product—an example of "Professional equipment at amateur prices." It's backed by the ABC guarantee—"Your money's worth or your money back!"

Cut out inefficiency! Get a mica condenser. Mail the coupon today!

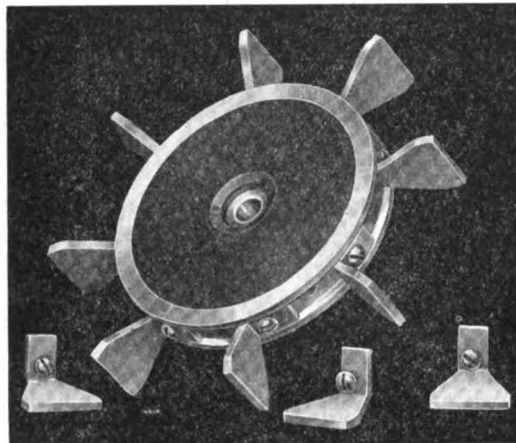
Wireless Equipment Co., Inc.,
188 Greenwich St., New York.
Enclosed find 75 cents. Send me by return mail one of your guaranteed, genuine mica grid condensers.

Name
Address
City..... State.....

When writing to Advertisers please mention this Magazine

Bust Thru the QRM With a Benwood Removable Point Disc

ANY
NOTE



ANY
FRE-
QUENCY

Double Your Radiation

Sparking points are variable from 2 to 16. Teeth are **Renewable** as well as **Removable**. Disc is **Six Inches** in diameter and sparking points are **One Inch** in width. Complete disc weighs less than half pound; absolutely accurate and finely balanced.

This disc enables the operator to vary the frequency of the spark at will, regardless of the speed of the motor used. It enables the operator to obtain the maximum radiation from any spark transmitter by being able to change the spark discharge frequency to conform to **Any Condenser Capacity** and **Any Wave Length** that is in use at the present time. This disc will absolutely increase the transmitting range of **Any** spark transmitter because it is at once applicable to any make transformer on the market regardless of the voltage. It is the ultimate in rotary disc design and fills the long-felt need of every radio man.

A **Clear note** can now be had at all times. As soon as the sparking points on this disc become worn and uneven a complete new set can at once be put into service thus assuring the operator of maximum results at all times. The center of the disc is **Moulded Bakelite**, the best insulation obtainable. Disc is fitted with carefully machined brass bushing and set screws for fastening to the motor shaft. It is also furnished with shaft for use with any of the enclosed **Benwood** gaps that are now in use.

Price complete with 16 sparking points, \$10.00

Specify size of motor shaft when ordering.

Extra sparking points 20 cents each or \$2.50 per set of 16.

The Benwood Company, Inc.

1300 OLIVE STREET

ST. LOUIS, MO.

Sold by **WESTERN RADIO ELECTRIC COMPANY**
Los Angeles, Cal.

EFFICIENT SHORT WAVE RECEIVERS

Complete except cabinet; consists of variocoupler, grid and plate variometers. Guaranteed for efficient operation and first-class materials and workmanship. Equipped with fine composition dials. **PRICE \$24, PREPAID.**

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EFFICIENT VARIOMETERS and VARIOCOUPERS

Formica forms are used in making these instruments exceptional values for the money. The cheapest on the market in price; as good as the best in operation. Guaranteed. **VARIOMETER \$4.; VARIOCOUPLER, \$4.25, PREPAID.**

"We Give the Values"

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THE ONLY BOOK
OF ITS KIND ON
THE MARKET

Compiled by the Engineers of the
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Written in a Non-Technical Man-
ner. Any Amateur can
Understand It.

35 Illustrations
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Order Now!

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PACIFIC RADIO PUB. CO.
50 Main Street San Francisco

RADEQ AUDION CONTROL PANELS

The best control panel for the money; has polished formica panel mounted on oak base and equipped with tube socket, grid leak, condenser, rheostat, and nickel-plated binding posts. Price without B batteries or tube, \$10.00.

Wireless apparatus made to order; sets designed to use material you now have on hand. Send for price list.

A. C. PENFIELD, Conneautville, Pa.

Best results with Knight Equipment

*We make everything that
can be had in radio apparatus*

Radio Telephone parts in
knock-down form, complete,
\$51.00.

43 Plate V. C. Condenser,
\$3.75. Write for our prices on
your needs.

Knight Electrical Laboratories

6053 Hollywood Boulevard
Los Angeles, Calif.



BURGESS "B" BATTERIES

ARE THE NOISELESS KIND—made with and without taps

Send for catalogue giving sizes and prices

BURGESS BATTERY COMPANY

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CHICAGO

"B" Batteries AN EVEREADY PRODUCT

43V. Batteries, tapped.....\$5.00
22½V. Batteries, Navy Type.... 3.50
22½V. Batteries, Commercial Type 2.00

Latter two types especially adapted to Cunningham and Radiotron Tubes. Postage Prepaid Anywhere in U. S.

Ets-Hokin & Galvan

Wireless Engineers
10 Mission Street San Francisco

CALL LIST ERRATA

The call letters and station address of Mr. W. A. Schonfeldt should be 6TY, 400 Clark Street, Sherman, Calif.

CALLS HEARD BY C. C. WHYSALL LOS GATOS, CAL.

(6DK), (6EA), (6IS), (6BA), (6ADL), (6AID), (6AGF), (7CW), (7ZJ).

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We are among the only radio concerns who still have the genuine Audiotrons in stock at the same old price, which is.....\$ 6.00

Arnold Control Panel 19.50
Arnold Coupler 20.00
Variometers 4.50
Variocouplers 5.00

Send For Catalogue

DAVID KILLOCH CO.

P 57 CHAMBERS ST.,
New York City

RADIO TOPICS

A Journal of Human Interest

—Should be read by every live radio amateur because it is always first with the latest.

—Should be handled by every dealer for his own benefit and for the good of his trade.

WRITE TODAY FOR A FREE
SAMPLE COPY!

Radio Topics

4533 No. Sawyer Ave., Chicago, Ill.

Purchasers of Radio equipment manufactured in the East

will find that prompt shipments can be secured from either of our two stores.

The Murdock, Clapp-Eastham, General Radio, Acme, Chelsea, and numerous other radio manufacturing plants are all within a short distance of our stores. All possibility of slow delivery is eliminated—our stock can be replenished at a moment's notice.

PLACE YOUR ORDER WITH US FOR

Murdock No. 55 2000 ohm. Telephone Headset	\$ 4.50	Acme A-2 Amplifying Transformer, unmounted	4.50
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General Radio A Battery Potentiometer, 400 ohm.	4.00	G. R. "A" Battery Potentiometer 400 ohms	4.00
Clapp-Eastham Z R D Variometer with dial and knob	6.50	Acme Transformers (C-W)	
Clapp-Eastham Z R D Variometer without dial and knob	6.75	200-watt, mounted	20.00
Murdock Variometer	8.00	200-watt, unmounted	16.00
Murdock No. 366 Variable Condenser	4.75	50-watt, mounted	15.00
Murdock No. 367 Variable Condenser	4.75	Acme 50-watt, unmounted	12.00
Murdock No. 368 Variable Condenser	3.75	General Radio Hot Wire Meters	
Clapp-Eastham No. 800 Variable Condenser, balanced	7.50	0-1 A Flush Mounting	7.75
Clapp-Eastham No. 800A Variable Condenser, balanced	9.50	0-3 A Flush Mounting	7.75
Clapp-Eastham No. 800B Variable Condenser, balanced	11.50	0-5 A Flush Mounting	7.75
Chelsea No. 1 Variable Condenser, .0011 mfd., mounted	5.00	0-10 A Flush Mounting	7.75
Chelsea No. 2 Variable Condenser, .0006 mfd., mounted	4.50	General Radio Rheostat	2.50
Chelsea No. 3 Variable Condenser, .001 mfd., unmounted, balanced type	4.75	Murdock Vacuum Tube Socket	1.50
Chelsea No. 4 Variable Condenser, .0006 mfd., mounted, balanced type	4.25	Clapp-Eastham Varlo-Coupler with knob and dial	7.50
A. R. Co. Amplifying Transformer, mounted	5.00	General Radio Grid Condenser, .0005 Ajax Buzzer .....	.25
Acme A-2 Amplifying Transformer, mounted	7.00	Ajax Transmitting Key	1.50
Acme A-2 Amplifying Transformer, semi-mounted	5.00	Acme A-3 Modulation Transformer, unmounted	7.00
		Acme A-3 Modulation Transformer, semi-mounted	5.00
		Acme A-3 Modulation Transformer, unmounted	4.50
		Clapp-Eastham Type Q, Amplifying Transformer, unmounted	4.00
		Chelsea Variable Grid Leak, ½ to 5 mgo., 10 steps	3.00
		Chelsea Oscillator	3.00
		Murdock Receiving Transformer, 1500 meters	9.00
		Murdock Telephone Condenser .....	.70
		Murdock Crystal Detector .....	.70

All of the above apparatus is made right in our own vicinity—save delay—order from Atlantic Radio! Postage Must Be Included.

Radiotron UV 200 (Detector)	\$5.00
Radiotron UV 201 (Amplifier)	6.50
Radiotron UV 202 (5 watt transmitting tube)	8.00

ATLANTIC RADIO COMPANY

(Incorporated)

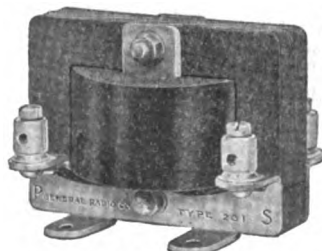
88 Broad Street
Boston 9, Mass.

Branch, 15 Temple Street
Portland, Maine

Request "Bulletin 14"

Increase Your C-W Range

USE CORRECTLY DESIGNED MODULATION AND AMPLIFYING TRANSFORMERS



Type 231 Transformer

Now that vacuum tubes have become standardized, it is possible to design transformers for particular tubes. We have produced two transformers to meet specific conditions. The first is the Type 231A Amplifying Transformer for the Radiotron UV-201 amplifier tube, and the second the Type 231M Modulation Transformer for the Radiotron UV-202 oscillator tube. If you want to get the maximum amplification from your amplifier unit, or to get the maximum modulation of your CW transmitter current, use our Type 231 transformers built for these specific purposes.

Send for Bulletin 907C describing these instruments.

PRICE, EITHER TRANSFORMER, COMPLETELY MOUNTED, \$5.00

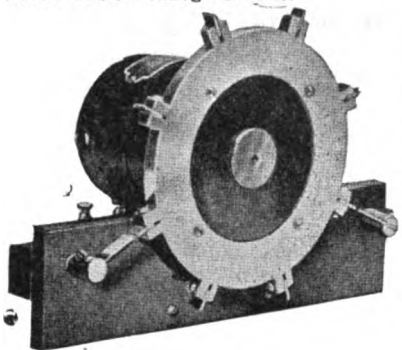
Direct or from your local dealer

GENERAL RADIO CO., Cambridge 39, Mass.



DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

A Word To the Wise!

The "STANDARD VT BATTERY" is made by people who specialize. They concentrate their facilities upon the manufacture of plate circuit batteries. They know how and why plate circuit batteries are used, and what is expected of them in the way of service—for which purposes an assembly of common flashlight batteries will not serve efficiently.

Dealers who sell any of the three types of the "STANDARD VT BATTERY" guarantee them fully. They know of their excellent qualities, and offer you the benefit of their knowledge and selection when they sell you the "STANDARD VT BATTERY." Still, they're not expensive. This, combined with A-1 quality, is the secret of their extensive use.

Treat yourself to a full round of satisfaction by purchasing the "STANDARD VT BATTERY" from your nearest dealer.

RICHTER-SCHOTTLER CO., MFRS.
293 CHURCH STREET NEW YORK, N. Y.

PACENT ELECTRIC CO., Sole Eastern Agents, 150 Nassau St., New York City



LOOK!!

A Yearly Subscription to QST and Pacific Radio News for \$3.25
You Save 75c.

Pacific Radio Pub. Co. - 80 Main St.
San Francisco, Cal.

ARCHIBALD AUGUSTAS GETS A SCARE

(Continued from page 347)

inspector's overweening assumption piqued the judge.

"I suggest that you keep your mouth shut!" snapped the ruler of the courtroom, glaring at Archibald Augustas with a glassy eye. "The case is dismissed. Get out!"

Fortunately for the young adventurer, Mr. Woodnut, the chief radio inspector had a sense of humor, and in spite of all protests on the part of Archibald Augustas, he insisted that the amazing amateur from Petaluma be permitted to go through with the examination.

The candidate came through with flying colors. Since Mr. Woodnut chanced to be again absent on the day when the lucky amateur completed the examination, it devolved upon Archibald Augustas to check the question sheets. Grudgingly, the assistant inspector checked out a percentage amply sufficient for a license; grudgingly, he got out the license-book and filled out a commercial first-grade license; and thirty minutes later when the new operator came back with the oath of secrecy duly sworn to, he still more grudgingly signed his name to the document.

"The next time you come for an examination in disguise, I would suggest that you engage a performer in a vaudeville minstrel-show to give you a few points regarding the preparation of your costume," he remarked in his extra-best secretary-of-the-navy style, as he handed over the license.

The freshly-made operator rolled up the crinkly bit of paper and stowed it away safely in an inner pocket before replying:

"Humph, I reckon if that cop hadn't grabbed you, you'd be runnin' yet!"—and with this the newly-fledged brass-pounder (er—it wasn't Samuel Jones, remember) drew himself up with all the proudness of an emperor and marched majestically from the room.

(The End)

PACIFIC COAST ADVISORY COUNCIL BENEFITS THE AMATEUR

THE first meeting of the Pacific Coast Advisory Radio Council was held at the Palace Hotel in San Francisco, March 15th. The following radio officials were present: Major J. F. Dillon, chairman of the board; Commander Clark, U. S. N.; Lt. Commander McCaughey, District Radio Communication Superintendent in San Francisco; Captain C. I. Hoppough, U. S. A. Signal Corps, Presidio, San Francisco; Mr. C. Langevin, Pacific Coast Chairman of the United Radio Telegraphers' Association; Mr. A. E. Bessey, Pacific Coast District Manager of the ARRL, and many other radio service company and manufacturers' representatives. A good attendance was had at the banquet and short addresses were delivered by the members of the Council. Commander Clark surprised the gathering with a most interesting address on the Naval Communication Service and the manner in which the navy traffic is taken "from the hook" and sent to the various stations in the world. Immediately after the banquet the meeting of the Council was called to order. Mr. H. W. Dickow introduced the members of the Council and an opening address was delivered by Major J. F. Dillon. Proposals were asked for

(Continued on page 352)

10c Charges Your Battery at Home With an F-F BATTERY BOOSTER

and your station will never be closed because of a discharged battery.



Is it not gratifying to feel that your filament battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station?

F-F Battery Boosters are automatic and operate unattended. Screw plug in lamp socket, snap clips

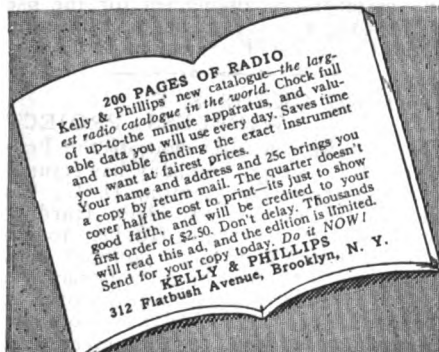
on battery terminals and see the gravity come up.

The ammeter shows you just the amount of current flowing. The full wave of current is rectified through adjustable carbon electrodes which maintain a constant efficiency and last for thousands of hours. Everything complete in one compact, self-contained unit.

The F-F Battery Booster is a Magnetic Rectifier for 105-125 Volt 60 Cycle Alternating Current. Bantam Type 6 Charges 6 Volt Batteries at 6 Amperes.....\$15 Type 16 Charges 6 Volt Batteries at 8 Amperes.....\$24 Type 166 Charges 6 Volt Batteries at 12 Amperes.....\$32 Shipping Weights 10, 12 and 15 Pounds.

Also Battery Boosters for 12 Volt Batteries, at same price. Order from your Dealer or send check for prompt express shipment. If via Parcel Post, have remittance include postage and insurance charges. Will also ship C. O. D. when requested. Also F-F Battery Boosters for Charging Batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. For Group Charging use our Full Wave, Automatic F-F ROTARY RECTIFIER of 100 volt 36 cell capacity. Order now or write today for free descriptive Booster Bulletin No. 33, or Rotary Bulletin No. 33A.

THE FRANCE MFG. CO.
Office and Works CLEVELAND, OHIO



No Tubes Sold

without complete instructions for operating efficiently.

ELECTRON RELAYS and A-P AMPLIFIERS

personally tested on actual receiving. A new tube or your money refunded if you are not satisfied.

For prices see front cover of this magazine.

B. F. McNamee

2436 Stuart St., Berkeley, Calif.

NEW YORK WIRELESS CONVENTION

Continued from page 335)

Federal Telephone and Telegraph Company have several new pieces of apparatus for use in connection with V. T. and C. W. sets, including some filament lighting and "B" potential transformers and telephone jacks which take care of the automatic filament lighting which has come to be such a feature of late.

John Grinan (J. G.), who, in bygone days, was the first to push a spark transmitter signal across the United States, was very much on the job. With his associates of the Continental Company, he was expounding the virtues of the Paragon Ten, which, by the way, was much in evidence in other booths, where receiving sets were kept in operation.

Mesco was also on the "qui vive," and the writer found Mr. Elts, manager of the Radio Department, perched atop a table in a secluded spot adjoining the lecture hall, where he was listening, unobserved, to a talk by Mr. K. B. Warner of Q. S. T. He is hot on the trail of an association of radio manufacturers and dealers, in which he has been able to create a great deal of interest. Sort of a Love Feast of Competitors.

F. M. Doolittle is belying his name, in that he is not doing little. Several of his new developments have been described in radio papers, but his latest development, and one for which he expresses a great deal of hope, is a new anchor gap, for use in connection with a break-in system. It consists of two plates separated by an insulating substance and held together by a screw and nut passed through the center. The gap is airtight and the surfaces are so close together that the increase in damping is very small.

The Signal Corps and the Navy kept booths in continuous operation, where several outfits, now used by those services, were shown in operation.

Among the other exhibitors were the Acme Apparatus Company, Adams-Morgan Company, American Electro-Technical Appliance Company, American Radio Relay League, American Radio and Research Corporation, Burgess Battery Company, Chicago Radio Laboratories, Experimenter Publishing Company, Lehigh Radio Company, Radio Distributing Company, Super Radio Laboratories, The Radio Club, Irvington, N. J.; C. D. Tuska Company, United States Department of Commerce, Radio Service, Westchester Electric Appliance Company, Inc., Wireless Press, and Y. M. C. A. Radio Schools.



New Products

—we have them first

STANDARD PRODUCTS
—we have them always
—And We'll Pay the Postage

**NEW TYPE JX
O-15 V. A. C.
VOLTMETER \$8**

Has same open scale designs as Type J and similar high grade meters, with flush case, 3 1/4 in. dia. Sapphire bearings and magnetic vane movement. A necessity for your power to insure their long life with A. C. in filament. Blue-print of circuit free with every meter of power tube.
UV 202 Radiotron, 350 volts, 5 watt...\$ 8.00
UV 203 Radiotron, 1000 volts, 50 watt... 30.00
Acme Fil. Heating Transformers, and other Acme products in stock. Get our circulars; and read P. R. N. Adv.

SOMERVILLE RADIO LABORATORIES

Winter Hill, 45, Massachusetts



Sectional Units

A SERIES of cabinets, all standardized, including receiving set, VT Detector, VT and one-step combined, one-step, and two-step amplifiers. You start with the receiver (complete in itself) and add on the other sections without discarding one particle of your original equipment.

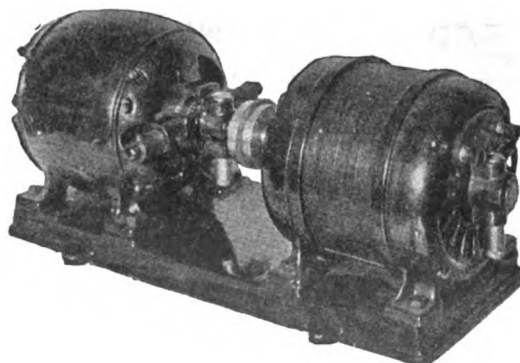
ABC sectional unit cabinets look like professional equipment, work like professional equipment, and sell at prices amateurs can afford. That's the result of standardized, automatic production in the best equipped radio plant in the world!

Backed by the ABC Guarantee.—"Your money's worth or your money back." (Send a nickel for complete circular.)

WIRELESS EQUIPMENT CO., Inc.
188 GREENWICH ST. NEW YORK

A "DX" Combination

The Radiotron U. V. 202 tubes and a RAY-DI-CO "HYLO"



Connect the filaments to the low voltage side and the plates to the high voltage side of the "HYLO", turn on the switch and watch the "calls heard" list.

Motor—110 volts, A. C. or D. C., as desired.

Made in capacities from 30 watts 375 volts for \$93.30, to 175 watts 600 volts at \$154, f.o.b. Chicago.

The "HYLO" generator can now be supplied separately.

All Ray-Di-Co motor generator products are FOUR BEARING machines, manufactured and designed in full accordance with A. I. E. E. specifications.

RAY-DI-CO
(RAY-DEE-KO)

2653-C N. CLARK ST.

Radio 9AG

CHICAGO, ILL.

H. H. BUCKWALTER, 713 Lincoln St., Denver, Colo.,

Representing RAY-DI CO in

Colorado, Wyoming, Utah, South Dakota, Nebraska, Western Kansas and Northern New Mexico.

INTRODUCING The PACENT UNIVERSAL PLUG

NO CONNECTIONS TO SOLDER

PRICE \$2.00

The Only Plug DESIGNED For
Radio Work

THE PACENT UNIVERSAL PLUG, now obtainable from your dealer, is the plug for which you have been waiting. It consists of three parts; two moulded bakelite pieces, each with a recessed finger grip, and the plug with its connecting spring clips. The two moulded pieces are held together with a single screw which fits into a threaded brass insert.

In addition to telephone headset work, the PACENT UNIVERSAL PLUG may be used very effectively for "plugging in" a microphone transmitter, manipulating key, a loading inductance, the search coil of a wave-meter, a remote control switch, a plate battery or high voltage generator, in fact its adaptability renders its name synonymous with its uses.

The effective and practical design of the PACENT UNIVERSAL PLUG was so appreciated by the United States Navy Department, that the plug was officially approved and a most gratifying letter was received from the Navy Department commending its many desirable features.

Catalog No. 50—PACENT UNIVERSAL PLUG—Price \$2.00 Bulletin P. 11 describing the PACENT UNIVERSAL PLUG and literature describing other unique apparatus will be sent you on receipt of five cents in stamps.

Dealers—Write immediately for our liberal discounts.

SOLE DISTRIBUTORS FOR

Wicony's Complete Line of "Eventual" Apparatus
Duo-Lateral Coils Pacent Plug Sullivan Apparatus
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Special Distributors for Brandes Phones

PACENT ELECTRIC COMPANY, Inc.

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Louis Gerard Pacent,
President

NEW YORK CITY

BLUE PRINTS

OF ALL THE PRINCIPAL COMMERCIAL TRANSMITTERS

Kilbourne and Clark 500 cycle Transmitters, impulse type.

Marconi 240 and 500 cycle Transmitters.

Independent 500 cycle Transmitters.

Arc Ignition Key System.

Splendid material for reference and home study.

\$2.00 A SET

PACIFIC RADIO SCHOOL ARC & SPARK SYSTEMS

433 CALL BUILDING

SAN FRANCISCO, CAL.

PACIFIC COAST ADVISORY COUNCIL

(Continued from page 350)

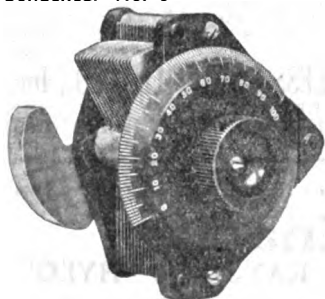
and the meeting began in earnest. Prof. Tinsley representing the S. F. Radio Club, read the first proposal. The purpose of the proposal was to secure the sanction of the Department of Commerce for wavelengths in excess of 200 meters for CW work and the abolition of the 300 meter wave for commercial work. Much discussion followed and the proposal was accepted by the Board. Revisions thereto will be made and it will be forwarded to Washington. Chairman Dillon received the wild applause of the evening when he announced that he would endeavor to have ten radio club members recommended for the use of the longer wave. The next meeting of the Council will be held in June.

HARDING OKEHS S. F. WIRELESS PROJECT

R. P. Schwerin, president of the Federal Telegraph Company has returned home from Washington, D. C., has been instructed by President Harding and Secretary of State Hughes to go ahead with the company's contract with the Chinese government to construct the largest wireless station in the world at Shanghai. Telegraphic advices from the national capital are to the effect that the Harding administration is confident it can get withdrawn or overruled the protest against the contract made to the Peking government by Great Britain, Japan and Denmark.—S. F. "Bulletin."

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No. 1—.0011 m.f. mounted	\$5.00
No. 2—.0006 m.f. mounted	4.50
No. 3—.0011 m.f. unmounted	4.75
No. 4—.0006 m.f. unmounted	4.25
Bakelite Dials only	.75

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET

CHELSEA, MASS.

Manufacturers of Radio Apparatus and Moulders of Bakelite

ANNOUNCING "HiCo" SERVICE

You who have tried "HiCo" service know it means prompt shipments and guaranteed satisfaction.

Formerly we confined ourselves to a very few lines, mainly our F-F Bantam Battery Booster at \$15.00. Now we are adding other well-known instruments such as Benwood Gaps, Eldridge meters, Baldwin phones, Acme apparatus, Vacuum tubes, detectors, amplifiers and transmitters, etc., etc.

Magnavox are now within reach of every amateur, price prepaid, \$45.00.

Send us your order for goods from the above lines. It will receive prompt shipment and be prepaid. Practically every order we receive is shipped within four hours.

HiCo, Box B268, MARION, ILLINOIS

S. F. NAVY DISTRICT ESTABLISHES NEW WIRELESS RECORD

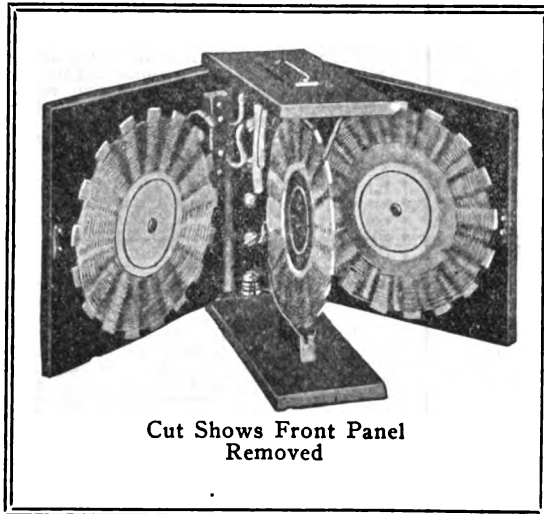
THE district banner for naval radio achievements in February hangs in the Twelfth Naval District headquarters.

During February this district received and sent over 1,000,000 words through a distance of almost 300 times the earth's diameter; brought in a ship in the fog by sending wireless bearings; relayed a message from one vessel to another 7000 miles from the first, and sent first aid instructions to the wife of an officer, the victim of appendicitis, isolated on the Farallones.

Commander Scott D. McCaughey is district radio chief.—S. F. "Call."

When writing to Advertisers please mention this Magazine

FOUR MORE STEPS—



Cut Shows Front Panel
Removed

of Amplification, or its equivalent, may be gained without additional expense by using a **"Spider-Web" Regenerative Set**. The outfit itself gives an amplification equal to two-steps and you save the price of two steps more on the cost. Just think---a complete Regenerative Set to bring in sparks or the phone concerts (tunes to over 450 meters).

Only \$8.00
Plus
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AGENTS WANTED

Distributed Exclusively in the West through

HERROLD LABORATORIES

"Everything for the Amateur"

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SAN JOSE, CALIF.

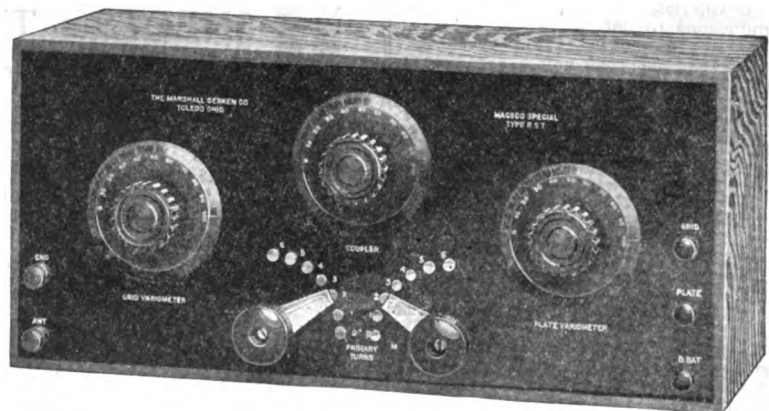
A **MAGECO** MASTERPIECE

**Short Wave Regenerative
Receiver**

**TYPE R. S. 7
PRICE \$50.00**

f. o. b. factory

150 to 750 meters



This regenerative receiver is constructed of the best material throughout. The panel is of grained Formica and beautifully engraved, the whole being enclosed in a Birch-mahogany cabinet and, to say the least, it is the last word in beauty and simplicity of operation. Each instrument is tested for C. W. before it leaves the factory.

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Whether or not you believe in the present electro-magnetic and valve theory of wireless, you should read my book "Revolutionary Theories in Wireless," and I believe you will agree with me that electro-magnetic waves are not the dominating cause for wireless transmission and that we have no valve or rectifying detectors in use at present.

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VT., 50 CENTS. Honeycomb coil mountings, 25c cents. Back mounted rheostats, 40 cents. Composition for molding your own knobs, panels, etc., 35 cents pound. Send stamp for particulars. Palmers Electrical Equipment Co., Dept. 5, Palmers, Minn.

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Regular price \$3.50.

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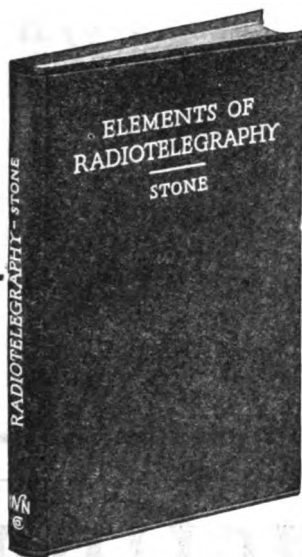
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 Money refunded if this phone set does
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 R, 1906 Clinton Ave., Irvington, N. J.



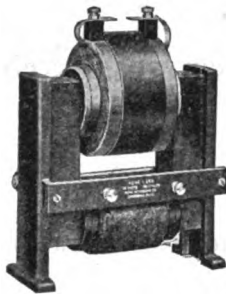
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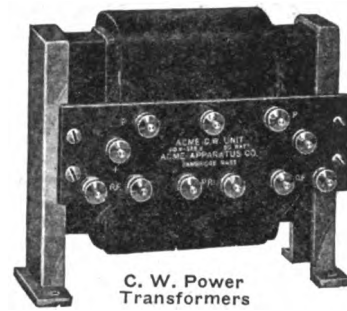
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 OR contain in a small space what so often requires
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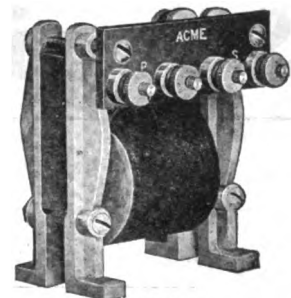


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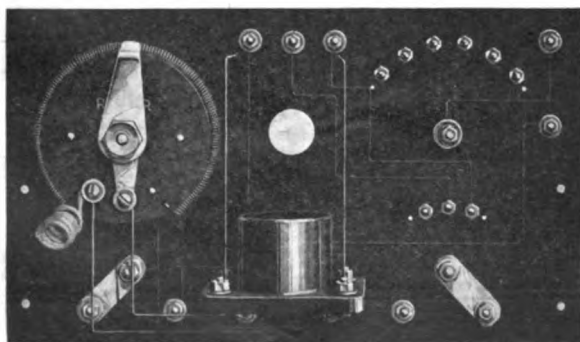
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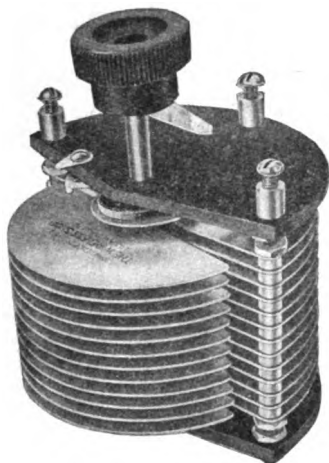
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“Wireless Shop Variable Condensers” Are Quality Instruments

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The new “Wireless Shop CW” Variable Condenser was developed to meet the demand for a condenser which would not break down when used with high plate voltages. You don't have to take your receiving condensers to pieces and add spacers any longer. The NEW WIRELESS SHOP CW VARIABLE CONDENSER does the trick.

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Regularly fitted with mounting screws and knob and pointer. Will be supplied with a metal dial instead of pointer at 75c additional, or with a moulded Bakelite knob and dial, finely engraved with graduations and numbers filled in white at \$1.00 extra.

Postal charges and insurance must accompany all orders. Insurance charges on any of the above condensers is only 5c.

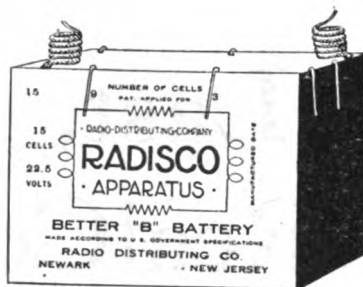
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No batteries
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15 cells.....22½ volts.

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Larger size has Variable Voltage
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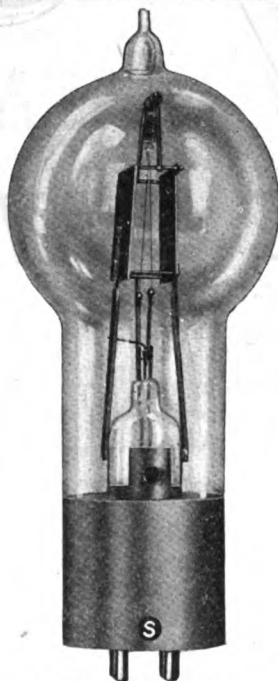
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*Pioneer Journal of
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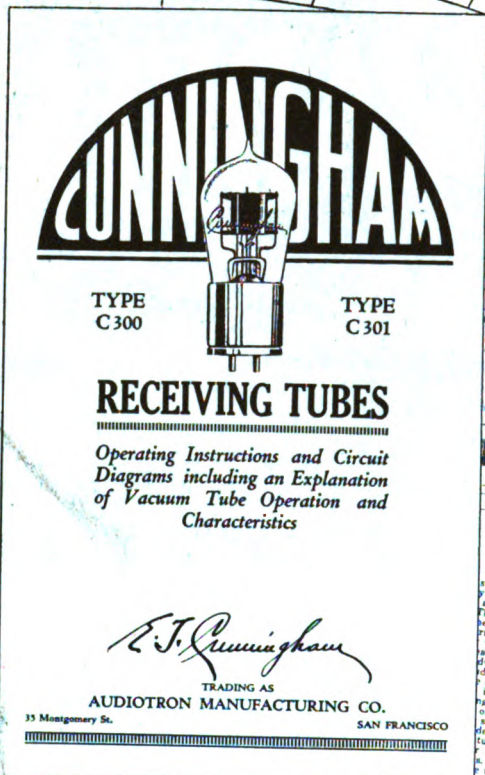
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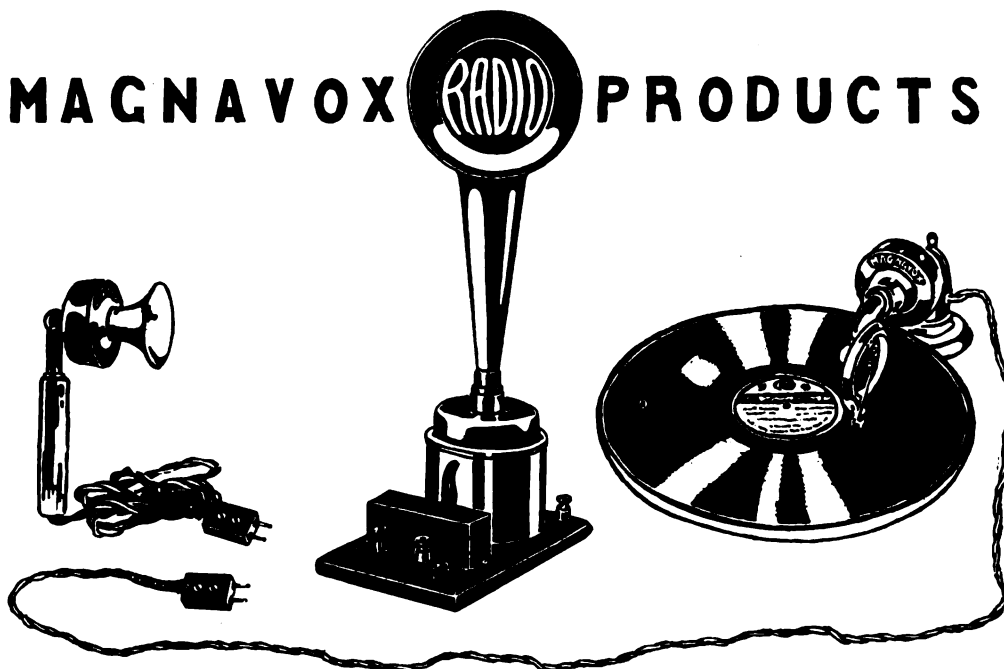
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This instrument solves the loud speaker problem for all. With a 2-stage amplifier, signals, voice or music will be reproduced loud enough to be heard over a large room or hall.

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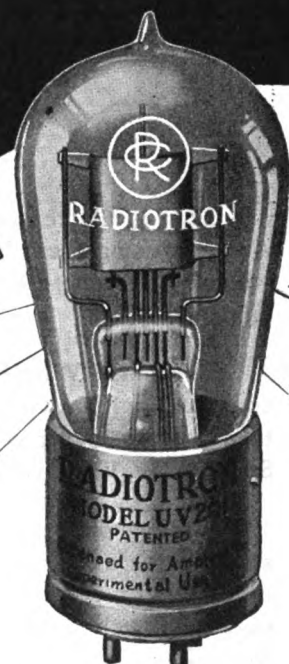
On the morning of January 17th at 3-30 a.m. I heard both 52a, Roswell, New Mexico and 6jd, Los Angeles, California working back and forth. Both stations were qes and as 52a is over 2000 miles from here and 6jd nearly 3000 I think it is a pretty good record. I was using one of your Radiotrons for receiving and that speaks volumes for the sensitiveness of the tubes. I have never known a tube as sensitive and believe that is a record for this coast if not for the world as both stations were qes, on 200 meters and I was using no regular aerial at the time (mine having been wrecked the night before by the wind) and it was all over-land receiving. Probably nearby wires acted as an aerial by induction but there was no direct connection.

I have just received confirmation from 6jd, corresponding in every particular with what I reported. I would have written before only I was waiting for confirmation for the record from Mr. Sizs.

Yours truly,
Harry B. Mattson
Radio 22W

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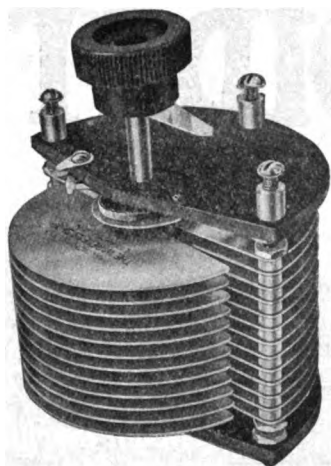
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PERSONALITY BEHIND THE KEY

By LAWRENCE MOTT

AUTHENTIC reports reach me of "fake" signals, of very "broad" transmission—on the part of them that have no license to exceed 200 meters—of persistent "air hogging"—and of other incidentals, none of which are at all conducive to the bettering of the Amateur Radio Cause.

I am impelled to a prophecy: Unless these things be stopped, the Federal Authorities will take certain steps that are not pleasant to cogitate upon!

It undoubtedly is a very great pity that a well-recognized type of Amateur operator is seriously endangering the feeling of kindliness and co-operation that is shown by the new Administration toward amateur radio effort. The innate selfishness of a few is most distinctly jeopardizing the pleasure and profitable research of a very great many!

Why is this?

Because there is a kind of human mind that actuates only in one way, to-wit: **for itself!** The rights of others, and the serious efforts of others—mean less than nothing to the selfish operator.

Furthermore: Linked with this selfishness is a form of rabid jealousy that would be laughable, were it not such a confounded nuisance. I know types of men who are jealous of another's better apparatus, of the kind of a license another has—and so on, ad nauseum. No one cares a whit about these childish whims and picayune attitudes—until these show themselves in such manners as breaking up serious long-distance work, and attempts at DX records, by persistent and useless chatter, on full power, with some chap two city blocks away—and by illegal methods of various kinds.

From my station on Catalina Island I nightly hear would-be KAISERS of the Air, in Los Angeles and environs,



Mr. Lawrence Mott, Associate Editor of "Pacific Radio News." Mr. Mott was formerly City Editor of the New York "Herald" and later acted as Staff Correspondent for the New York "Sun" in the Far East during the war period. His Radiotorials and articles on CW activities will be of interest to every enterprising radio amateur.

operating on—to say the least—"broad" wave lengths. I hear the owners of fine stations vainly trying to get through the infernal racket in order to do serious work—work that tends to the furthering of radio effort because of its very earnestness of character and studiously-careful operating conditions. I hear two-letter signs—strictly forbidden. I am informed that a certain well-known amateur in Los Angeles whose station has never had a black

mark against it, and whose reputation for effective achievements is second to none—has been very seriously annoyed by amateurs in the northern part of the State, "faking" his call, and by loosening of couplers, obtaining a fading effect that would deceive any but a well attuned ear. I understand that this "faking" of his call has brought him up on the carpet before the Radio Inspector.

And the mainspring of ALL this sort of contemptible work is . . . jealousy!

Radio should not be looked upon as a boyish game—a "stunt"—whose sole object is to have something to boast of! I think that I am not putting the case too strongly when I say that there is no more entrancing field of endeavor, nor is there one whereby more actual GOOD can accrue to this great Nation of ours, than by all manner of radio research and invention. Every useful discovery is a step forward.

In all these praiseworthy results the Amateur classes have every chance to share. There are many amateurs who have developed distinctly new apparatus, and derived excellent things therefrom. This because of their unique opportunities to experiment—one with the other, etc.

As I have said in a previous article—the Authorities at Washington have shown that they are glad to welcome, recognize and assist the serious-minded individual in the radio field. But that they will NOT permit of the courtesies and leniency to be made ducks and drakes of by a heterogeneous lot of narrow-minded, callow youths, whose utter irresponsibility is something to marvel at and cogitate upon!

I have written to Secretary Hoover—and herewith publicly suggest—that a

(Continued on page 387)

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1306 Hartford Bldg.

Seattle Office.....419 Pioneer Bldg.
London Office....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

IN part one of this series of articles the audion itself was discussed. We shall now consider some types of amplifiers suitable for radio telegraphic and telephonic work themselves. For our purposes audion amplifiers may be conveniently divided into the following classes:

1. Voltage amplifiers.
 - a. Radio frequency.
 - b. Audio frequency.
2. Power amplifiers.
 - a. Radio frequency.
 - b. Audio frequency.

We will now discuss amplifiers in the above named order.

Voltage Amplifiers

As has been previously stated the inherent characteristic of the audion is that when a certain a. c. voltage is impressed upon the grid, an a. c. flows in the plate circuit which is many times larger than the grid voltage which caused it to flow. Let us consider a typical circuit, see Fig. 4. The secondary of the input transformer is wound so as to impress as high a voltage as possible on the grid. (B) and (C) are the usual grid and plate batteries and (Z) represents the load into which the output of the audion is delivered. Now let us consider two cases. (1) when (Z) is pure resistance and (2) when (Z) is practically

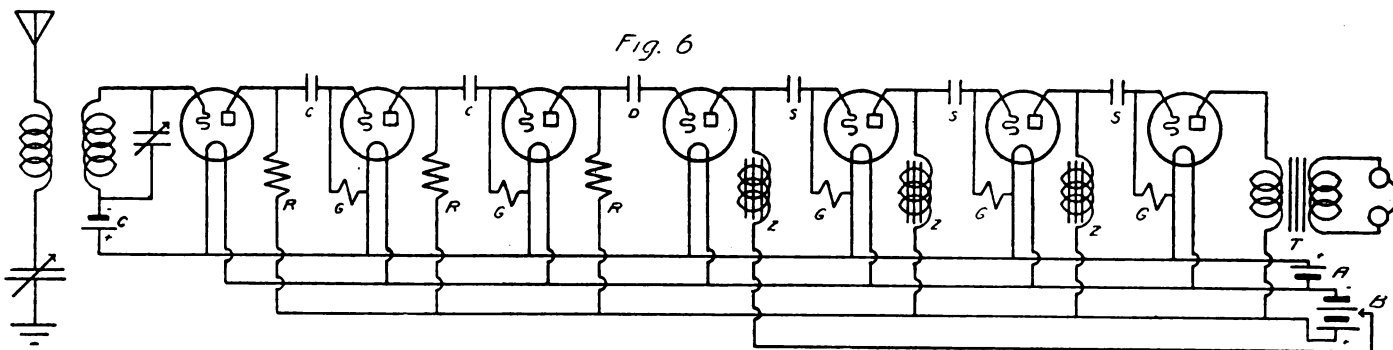
were not for this property of the resistance coupled amplifier it would be impossible to construct a radio frequency amplifier whose action is practically independent of the wave length of the incoming signals nor would it be possible to apply amplifiers to cable telegraphy when the frequencies are so low that it would not be practical to construct reactances of the necessary size for best results because of their size and cost.

As has been previously stated, the resistance coupled amplifier fills the bill for an aperiodic radio frequency amplifier. For wave lengths below 600 meters it is not practical to use over two steps of amplification because one is not able to properly control the resonance point. In relay and long distance work it is very often desirable to increase the selectivity of the receiving set beyond the limit obtainable by the usual tuning devices. An amplifier which is not aperiodic but has

facility in readjusting it for the next station.

For audio frequency the question of distortion must be considered. For radio telegraphic signals and the spoken voice the reactance coupling is to be preferred because of the lower plate battery but it is not sufficiently free from frequency effects to give the very best results for music as the range of frequencies for music is far greater than for the spoken voice. Hence for the very best results with music the resistance coupling is to be preferred. It must always be remembered that to obtain distortionless amplification one must not add so many steps to the amplifier that the variations in plate current ever exceed the straight portion of the characteristic curve of any tube used in the amplifier.

The circuits previously shown do not show the necessary details for best operation in practice. Suitable practical circuits will now be discussed. Fig. 6



pure reactance. In case (1) a mathematical investigation of the circuit (which is outside of the scope of this paper) shows that it is necessary to use a resistance at (Z) whose value is about ten times the plate impedance of the tube in order to get an amplification of the incoming voltage at least 90 per cent of the voltage amplification constant of the tube. While on the other hand a mathematical investigation of case (2) shows that the reactance at (Z) need only be two or three times the plate impedance of the tube to get 90 per cent of the maximum voltage amplification of the tube. The above clearly indicates that it would be very advantageous to use a reactance instead of a resistance at (Z) because if a resistance were used it would be necessary to use a very high (B) battery in order to get the necessary difference in potential from filament to plate for maximum amplification. The use of a reactance would permit a much smaller initial and upkeep cost of the (B) battery and for the average amateur this item is of extreme importance. It must be remembered, however, that the resistance coupled amplifier has certain very distinct advantages over the reactance coupled type. Its operation is practically independent of the frequency of the current to be amplified except for extremely high frequencies and it produces extremely little distortion. If it

a sharp peaked resonance curve is excellent for this purpose. For this purpose the tuned reactance coupled is the most suitable. See Fig. 5 for connections. For 200 meter work, coil (L) should be about 25 turns of No. 20 B. & S. gauge D. C. C. wire wound in a single layer on a tube about three inches in diameter. Condenser (N) should be a continuously variable condenser of about 0.0005 mfd., maximum capacity. This arrangement can be carried out to

shows a practical circuit for a combination of three stages in resistance coupled radio frequency, a detector and three stages in reactance coupled audio frequency amplification. It will be noted that all tubes are worked from a common filament and a common plate battery. For best results it is essential that the adjustable tap on the plate battery for the detector tube shown be used.

A word about the construction of

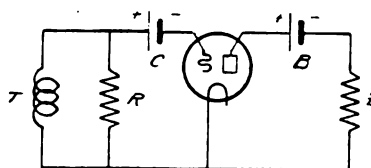


Fig. 4

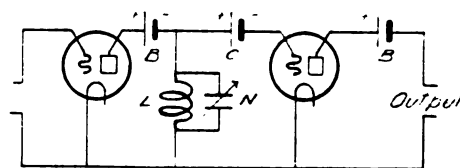


Fig. 5

5 or 6 steps with good success as the resonance point of each step can be controlled and adjusted to its proper value by the operator. Should extreme selectivity be desired, each coil and condenser can be replaced by a loose coupler, the primary and secondary of which are each tuned by a condenser. In this arrangement the degree of selectivity is controlled by the amount of coupling between the coils. This method, while extremely selective, is not to be recommended because of the dif-

high resistances for amplification is out of place here. The common high resistance for grid leak work consists of an ink or a pencil mark on a strip of paper. This will work satisfactory for a single detector tube but not for an amplifier. The coupling resistances should be preferably graphite rods or other substantial inductance free resistances capable of carrying at least 10 milliamperes without heating. For grid leaks, graphite rods should be (Continued on page 384)

THE MAGNETIC AMPLIFIER

A Treatise on its Theory, Design, and Construction.
By Jennings B. Dow

Published by Permission of the Secretary of the Navy.

BEFORE taking up the subject matter of this article, a few paragraphs will be devoted to some of the fundamentals which must be considered in the design of the magnetic circuit in general.

Iron is a substance with which the average experimenter is more or less familiar, however, there are a few points which must be given additional consideration in view of its application herewith to high-frequency circuits and apparatus.

If an electric current is passed through a long coil of constant section wound uniformly with N turns of wire per centimeter of axial length, each turn conducting a current of I amperes, the field intensity at any point in the plane of the central turn when the sec-

The former is due chiefly to the molecular structure of the iron, and increases with the frequency at which magnetization takes place, i. e., for every magnetic cycle which the iron passes through a certain amount of energy is lost through hysteresis and this appears as heat in the iron. Fig. 2 shows a typical hysteresis curve for a given sample of iron. The abscissae represent the field intensity and the ordinates, the magnetization or flux density within the iron. The area bounded by the curve is a measure of the loss due to this cause.

Eddy current losses are due to the electrical conductivity of the iron, and vary also as the frequency. If it were possible to insulate each particle of the iron so that no current paths could be formed, no loss from this cause would result. In practice, magnetic circuits in iron are laminated to reduce this loss to a minimum, and the nicety of lamination is governed by the frequency at which the magnetic circuit is to be worked.

In the selection of iron which is to be used in magnetic circuits operated at commercial frequencies, one has merely to consider the following qualities in order of importance (neglecting mechanical considerations):

1. Iron losses.

(At frequencies below 500 cycles per second, 90% of these losses are ordinary due to hysteresis alone and seldom exceed four watts per pound of iron used).

2. Induction characteristics.

(The induction characteristics of good grades of electrical sheets are quite similar and seldom vary enough to make choice uncertain).

3. Stability or ageing.

(This may be determined from a sample and corrected by treatment).

In the selection of iron for use at radio frequencies, one must consider the qualities in a vastly different light. Here also the iron losses must be considered first, but instead of finding 90 per cent of the total losses due to hysteresis, only 25 per cent is found. The remaining 75 per cent is accounted for in eddy currents. These figures must not be taken to mean that there is less iron loss due to hysteresis in the second case, for the total losses may be fifty times greater under certain conditions of magnetization. The above figures are based upon data collected in actual practice, using electrical sheets manufactured by the American Sheet and Tinplate Co. Number 29 gauge "Apollo" was used and the laminations were insulated additionally with 5 mils of fish paper. The apparently great eddy-current loss resulted from the fact that the limit of lamination was reached. If it were possible to obtain good sheets

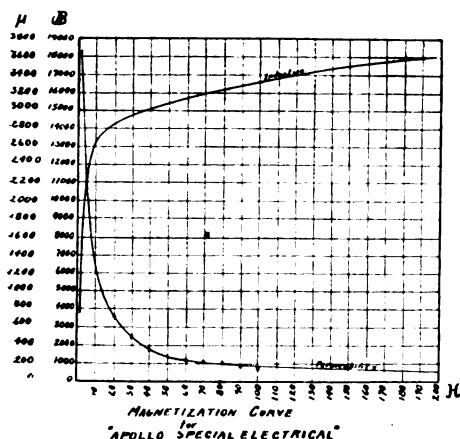


Fig. 1

tion of the coil is of any shape and its dimensions are smaller compared with the axial length, is $H = x3.1416 \times NI$ lines per square centimeter. 10

If a bar of some magnetic substance such as iron, is substituted for the air core, a flux density, $B = 4\pi x3.1416 \times$ Permeability, will be produced in the iron for every ampere turn. Solving these equations for permeability, permeability

$$\frac{B}{H}$$

This relation is called the permeability, and for low degrees of magnetization, its value for iron may be as great as 6000. The amount of induction in iron for any magnetizing force is not the same, and as a matter of fact, varies over a considerable range, as may be seen by referring to the curves in Fig. 1, which are typical of a good grade of transformer iron. From this fact, it will be observed that the permeability of a given sample of iron is not a constant, and varies also over a considerable range. The permeability curve for this sample of iron is plotted from

$$\frac{B}{H}$$

in the same figure. The losses in a given piece of iron influenced by magnetic lines of force consist almost entirely in hysteresis and eddy currents.

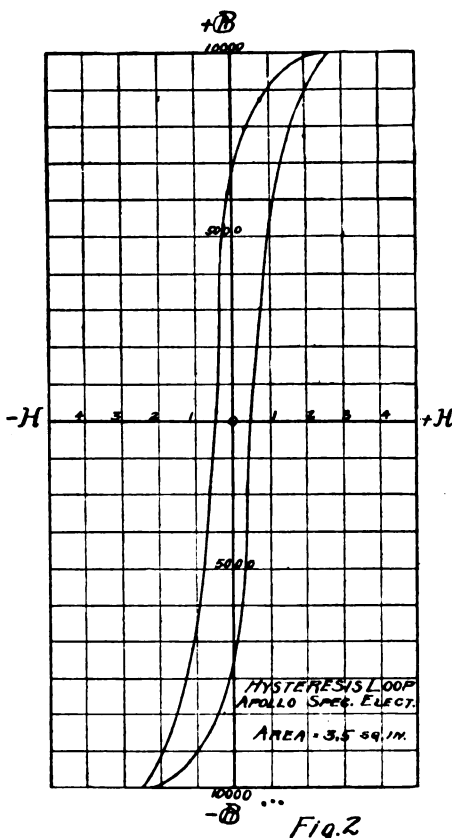


Fig. 2

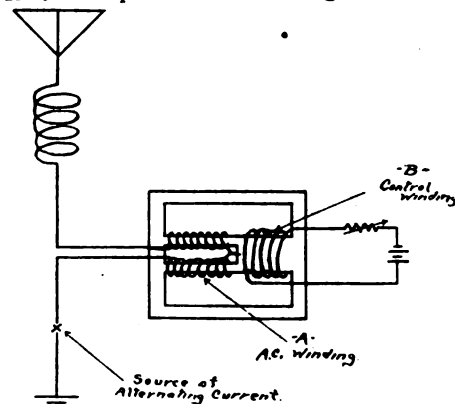


Fig. 3.

of number 45 or 50 gauge, the total losses would probably be reduced to one-half, and possibly not more than 30 or 40 per cent of these could be charged to eddy-currents.

At a given frequency, the hysteresis losses in the various grades of rolled sheets will be found not to vary considerably, and this will be found especially so as the frequency increases. While no actual figures are available to verify the following statement, it may be said that a frequency of 1,000,000 cycles per second, the hysteresis loss in iron would be the same for all grades, and this, regardless of thickness or other dimensions. In the selection of iron for work at high frequencies, particularly radio frequencies, it becomes a matter of considering only eddy current losses, and selecting iron which can be manufactured into shapes which will eliminate these losses. This practically eliminates the high silicon alloys which have won such great favor in general electrical work, for it is impossible to manufacture this substance into thin sheets. This material was used, however, in the construction of the single piece of apparatus described in this article, but this attempt was entirely experimental and efficiency was given secondary consideration.

In the design and construction of the (Continued on page 381)

THE CALIFORNIA THEATRE RADIOPHONE

(By Lieut. E. W. Stone)

THE De Forest radiophone station operated at the California Theater in San Francisco by the Moorhead Laboratories, Inc., of that city, which is the exclusive distributor of the De Forest Company on the Pacific Coast, has been in operation for over a year and it is thought that a description of same will be found of interest to readers.

The California Theatre is the largest motion picture house in San Francisco and is one of three controlled by the Famous Players-Lasky Corporation, the other two being the Imperial and Portola Theatres. A fourth, the Granada, is under process of construction.

The station was installed early in 1920, through the courtesy of Directors Roth and Pardington of the "Big 3" Theatres, and is located in a concrete room in the fly galleries of the California Theatre. The antenna is rigged off the tower of the Humboldt Bank Building, directly adjoining the theatre.

The transmitting set consists of the standard De Forest 1 KW radiophone set with additional loading inductance so as to obtain the working wave length of 1260 meters. The call letter of this station is 6XC. The antenna current varies from 4 to 5 amperes, according to the amount of input energy. Ordinarily, less than a half kilowatt is used for transmission. As the set is essentially an experimental one, various transmitting circuits of the De Forest Company have been tried out. The circuit at present in use is one developed by the engineers of the Moorhead Laboratories, for which patents have been applied. The receiving set is of the standard De Forest type.

For best results in receiving from the California Theatre, the following Ultra Honeycomb Coils should be used: Primary—DL 200, with series condenser on moderate antenna. Secondary—DL 200, Tickler—DL 150.

In connection with the transmission of music, several interesting methods have been developed through experimentation. For collecting and transmitting the music from the theatre's symphony orchestra of 50 pieces a large Magnavox horn is suspended in the fly galleries in such a position as to be clear of the side "drops." At the small end of the horn, a Kellogg microphone transmitter is mounted in a vertical position. From here the usual wires are lead to the radio modulating circuit. For

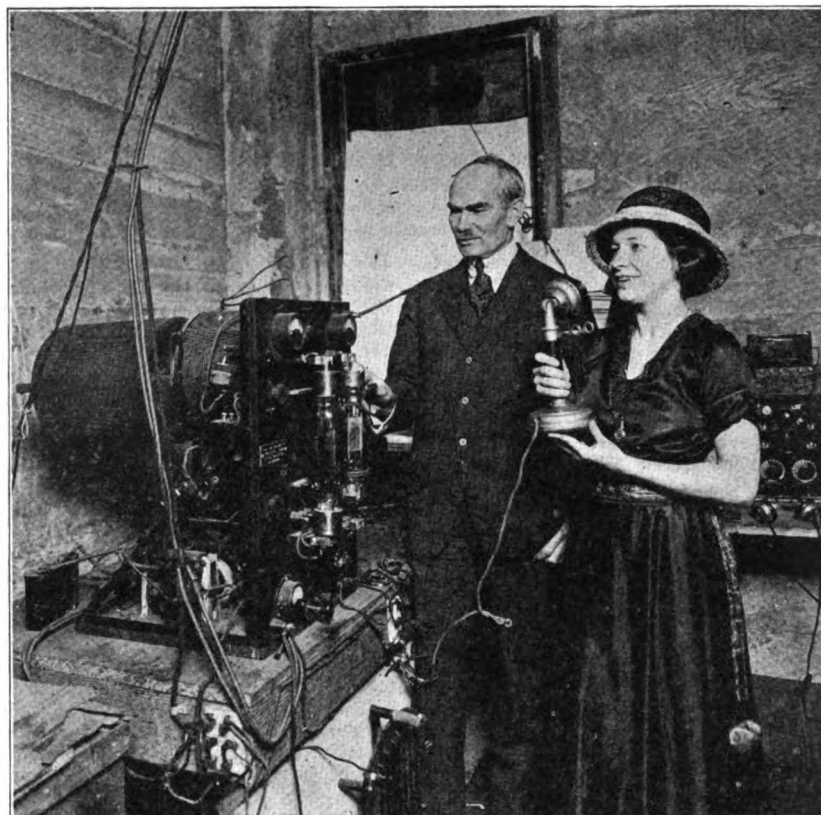
the transmission of phonograph records, several devices have been used. One is a standard Magnavox phonograph microphone, consisting of a microphone mounted at the end of the usual phonograph tone-arm. Another method developed by the Moorhead Laboratories is to utilize the steel needle holder so as to bear directly on the microphone diaphragm in place of the usual phonograph diaphragm.

For special concerts, which are frequently given, a sound-proof room in the basement of the theatre is utilized. For small chamber or instrumental music, a Magnavox horn similar to the one suspended in the fly galleries is utilized, but for vocal selections Kellogg desk transmitters are used by each singer. By placing the singers with their backs to the grand piano used for accompaniment, enough of the sound intensity from the piano is obtained through the singers' microphones so as to obtain a proper blending of the voice and piano.

Harp solos by Miss Jay Clark, piano solos by Mr. Hans Hanke, and vocal solos by Miss Mary White, Miss Ruth Williams, and Mr. Ford Rush of the California Theatre, and Madam Frieda Hempel and Forrest Lamont, stars of the Chicago Grand Opera

wit and volubleness in ordinary circumstances, though voiceless after the incident, wrote reams of letters during the afternoon protesting against being dumb and insisting that she felt no discernible effect except her mysterious inability to articulate.

It is thought that the fright, accompanying the electric shock, temporarily paralyzed the vocal cords, and that Miss Grady will be as chatty as ever when she punches the navy time clock at a minute to nine.—S. F. Examiner.



The Radio Room at the California Theater in San Francisco. Dr. Lee De Forest is shown demonstrating his invention to Miss Mary White, one of the many entertainers who have had the distinction of singing to the "unseen audience."

Company, have been the big features of the special concerts.

The regular concerts, consisting of the Herman Heller Orchestra music and phonograph records, are sent out at 4:00, 7:15 and 9:00 p. m. on weeks days, lasting for at least one-half hour. Special vocal and instrumental concerts are sent out at 9:00 p. m. on Wednesdays, and a special Sunday concert given by the Herman Heller Orchestra is sent out from 11:00 a. m. to noon.

The transmission of music from the De Forest station at the California Theatre has developed from an experimental standpoint to a worth-while contribution to the musical progress of the city, and receiving sets for the reception of this music alone have been installed at clubs, hospitals, hotels, and many private homes since the inauguration of this service.

The accompanying photograph shows Dr. Lee De Forest, inventor of the audion, at the radio set, and Miss Mary White singing over the set on the occasion of one of the special concerts.

The station is operated under the direction of Lieut. Ellery W. Stone, general manager of the Moorhead Laboratories; Mr. B. F. McNamee, chief engineer, and Mr. J. E. Squires, operator of the station.

NAVY RADIO GIRL LOSES VOICE FROM ELECTRIC SHOCK

HER voice lost, but otherwise absolutely unharmed by contact with a high voltage wire of the radio apparatus which she was attempting to operate at Twelfth Naval District headquarters, Miss Clara K. Grady, secretary of Lieutenant J. O. Twiss of the navy radio service, offered a baffling problem to the navy doctors who attended her following the accident.

Miss Grady herself, who bubbles with

Have you a copy of Lieut. E. W. Stone's "Elements of Radio Telegraphy"? The book contains over 400 pages of radio data, much of which is found in no other radio book. Price \$2.50 per copy, postpaid. Pacific Radio Publishing Co., San Francisco.

The Leo J. Meyberg Company of San Francisco has installed a radio telephone in the Fairmont Hotel. Concerts will be given on Monday and Friday evenings from 8 to 9 o'clock.

AN INTERESTING PAPER ON RADIO COMMUNICATION

LIEUT. ELLERY W. STONE, U. S. N., R. F., general manager of the Moorhead Laboratories, delivered a lecture on the radio-telephone, followed by a demonstration of a radiophone in operation, before the San Francisco Electrical Development League, on January 24, 1920, and the Commonwealth Club of California on March 18, 1921, at their weekly luncheons held at the Palace Hotel in San Francisco.

Lieutenant Stone's talk is reproduced below.

At the Commonwealth Club luncheon the following musical program was rendered by local artists:

1. Vocal Solo—"Do You Ever Think of Me?"
By Miss Ruth Williams
2. Vocal Solo—"I'm Learning to Love You"
By Mr. Ford Rush
3. Piano Solo—"Caprice Viennois"...Kreisler
Br. Mr. Hans Hanke
4. Vocal Solo—"Patsy"
By Mr. Rush
5. Vocal Solo—"Humming"
By Miss Williams

The lectures and concerts were given in the ballroom of the Palace Hotel before audiences of several hundred. Although the ballroom is a very large room, the music was as loud as that of an orchestra and completely filled the room.

Mr. President, Ladies and Gentlemen:

I propose to tell you today something about what is probably the latest form of communication, that is to say, the radio telephone. And following my talk, I hope to present a demonstration of actual radio telephone operation, receiving music and speech from the DeForest radio station at the California Theater. I say "hope" advisedly, because upon the occasion of our last demonstration, the fuses at the transmission station were inconsiderate enough to blow out, which caused a delay of some twenty minutes or more. However, I have given instructions today to have all of the fuses "coppered" with No. 10 wire, so unless these "grin and bear it" fuses should renig on the job, we expect to exhibit to you a satisfactory demonstration.

In order to have a proper conception of the radio telephone, it will be necessary for me to review briefly a few of the facts concerning its theory and development, and I hope you will not consider that I am turning this luncheon into a school room.

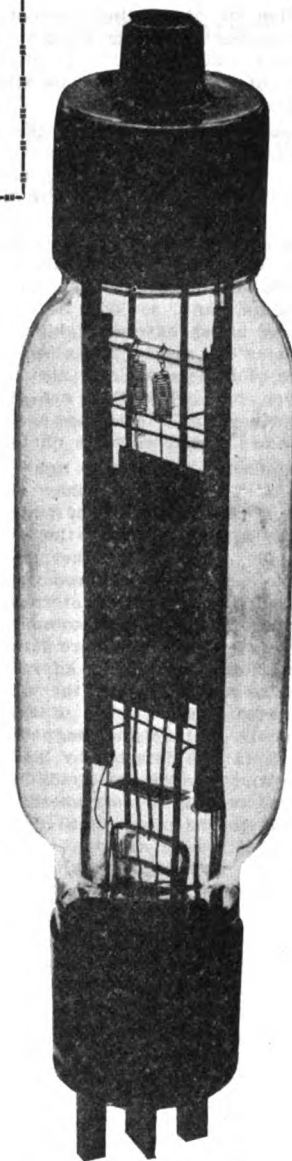
Communication by wireless is carried on by ether waves, and it is helpful in understanding these etheric or electromagnetic

waves to consider waves on water, which are closely analogous. If we drop a rock into a pool of distilled water, there will be waves radiated in all directions from the center of the disturbance. These waves consist of crests and troughs—the crests, of course, constitute the top part of each wave, and the trough, the lower part between the troughs of any two successive length of such waves by taking the distance between the crest of one wave and the crest of the next succeeding one. This distance is, of course, the same as the distance between the troughs of any two successive waves, and this measurement is called the wave length. It is obvious that as we increase the number of waves radiated in any unit of time, say a second, they will be more closely crowded together, so that the wave length is decreased. The number of waves radiated per second is called the "frequency," and it is readily seen that as the frequency is increased, the wave length is reduced.

Sound waves, which affect the ear, travel on a gas, a liquid or a solid, as their conducting media. The ear is only sensitive to sound waves of definite frequencies—from 16 to about 32,000. This range of frequencies is indicated on this chart, as shown, but the waves used in radio transmission travel on an entirely different medium, which pervades all space and which, for want of a better name, we term the "ether."

In the 80's, I believe it was 1883, an English physicist by the name of Maxwell, advanced the theory that light waves, as we commonly know them, are electromagnetic waves traveling on this mysterious ether—the difference in color in light waves being simply a difference in frequency or wave length. These light waves travel at a speed of 186,000 miles per second, or seven and one-half times the circumference of the earth. Wireless waves are of exactly the same nature as light waves, and have the same velocity, so that if it were possible to build a sufficiently powerful station, we should be able to transmit a radio wave seven and one-half times around the earth in one second.

Since Einstein published his now famous Principle of Relativity, there has been some doubt in the minds of scientists as to the necessity for our arbitrary conception of this almost fictitious ether. If Einstein is correct, there is very possibly no mysterious ether at all, but I hope you will not ask me



A DeForest Power Tube

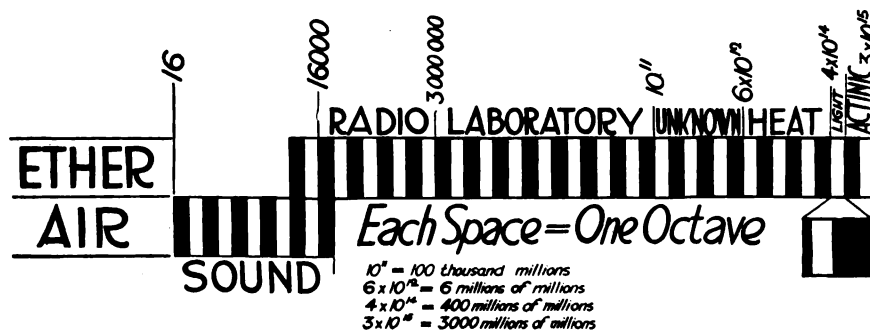
any questions about his theory of relativity because I happen to be one of the unfortunate many who are not educated to the point of understanding the fourth dimension and theories of relativity.

Just as the ear has certain frequency limits of sensitivity, so also will the eye respond to waves of given frequency only. The lowest frequency to which the eye will respond is about four hundred millions of millions per second, and electrical waves striking the retina of the eye at this frequency register the color red on the brain. The highest frequency to which the eye will respond is just about double this frequency, and at this rate of vibration we sense the color violet.

This band of colors indicated here, which you will recognize as the primary colors of the rainbow, range successively from red, orange, yellow, green, blue, indigo, through to violet, differing from each other only in their frequency.

It is interesting to note that while the ear responds to an actual physical vibration, the eye responds to an electrical one, and while we do not fully understand these things at present, it is very possible that the phe-

(Continued on next page)



nomenon which actually occurs is the generation of alternating currents of various frequencies in the nerve channels connecting the eye and the brain. In other words, our sense of sight is really a detector of electromagnetic waves.

Now, I have shown that the eye is sensitive to electromagnetic waves of certain very limited frequencies. There are frequencies very much higher than those of the color violet which are popularly termed "ultra-violet" waves, and we find such very high frequency waves emitted from radioactive substances such as radium, thorium, uranium, and so on, X-Ray tubes, and bodies under extremely high temperatures, such as the sun or the electric arc. These ultra-violet waves are also called actinic waves, and while they are of too great a frequency to affect the eye, nevertheless they are registered on a photographic plate.

Similarly, below the light waves, there are a great many other electromagnetic waves, the frequencies of which are too low to be distinguished by the eye, but which may be detected by other media. For example, below the color red we have a series of radiations popularly termed "infra" (or below) red waves, the commonest of which are heat waves. You are familiar with the fact that when a piece of metal is heated, such as an iron poker, the vibratory energy imparted the molecules of the metal cause them to emit electromagnetic heat waves which can be detected by holding the poker near the face or the hand, but which cannot be seen until more energy has been imparted to the poker, until finally the waves are radiated at so great a frequency that they are able to affect the eye and we say the poker is "red hot."

Below the infra-red, or heat waves, there are electrical waves of frequencies which have been produced in the laboratory but which are too short to be used for wireless communication.

At the lower end of this chart are shown the waves actually used for radio communication, and their frequency varies from about 16,000 to 3,000,000.

Although I have shown the frequencies of sound waves which are sensible to the ear, at the lower end of the chart, they are really not electromagnetic waves, but are only included to show you the magnitude of the radio frequencies.

Each division on this chart represents an octave; that is to say, each unit of frequency is twice that of the one next below it. This means that this chart is laid out according to geometric law and not a straight line progression, because each unit doubles the one preceding. This is similar to the laying out of a slide rule.

Now we have seen that to produce waves, whether they be sound waves or electromagnetic waves, it is necessary to have some vibrating medium which will set up these waves. In the case of sound waves, it is a vibrating solid, gas or liquid, but in the case of electromagnetic waves, it is a conductor which is vibrating electrically, or which contains a vibrating electrical current, and this we term an alternating current.

It has long been known that the discharge of a condenser or Leyden jar is oscillatory. In other words, it sets up electrical currents of a radio frequency; that is to say, one of the frequencies shown on the lower end of this chart and which is suitable for radio communication. In building a radio station, therefore, we must erect a condenser big enough to handle powerful electrical currents, so that the current in this condenser can be of the power frequency to radiate waves. As you know, a condenser consists

of two conducting surfaces separated by an insulator, which may be of paper, glass, oil, or mica. This big condenser which we use in a radio station is called the aerial or antenna and consists of the elevated portion which constitutes one plate of the condenser, the other conducting plate being the earth, and the air between the two forming the insulator.

The different systems of radio-telegraphy are simply the different methods of charging this enormous condenser, and the nature of the waves radiated from this condenser depends upon the kind of current which the particular charging apparatus supplies to the antenna. Thus, it is sufficient for wireless telegraphy to set up electrical currents in the antenna which can be regulated by a telegraph key, but for the wireless telephone these currents must be modulated by the human voice in order to produce speech at the receiving end. This is exactly similar to wire communication. In the telegraph a continuous flow of current is made and broken with a telegraph key, while in the telephone a microphone, or transmitter, through its varying resistance, modulates these currents to conform to the human voice.

It is interesting to note that in wire communication, the telegraph preceded the telephone, and so in radio, Marconi's telegraph preceded by some years the radio telephone, as we know it today.

The delay in the development of the radio telephone is due to the fact that until recently we did not have a generating device which would produce oscillations regularly and continuously enough, so that no distortions would be introduced into the radio telephone speech. The waves produced by the old-time spark sets were so irregular that to superimpose voice currents on these spark waves would have produced an unintelligible jumble. The device which made the radio telephone possible is known as the "audion" or vacuum tube.

This tube came into being as the result of an early discover of Edison's, known as the "Edison Effect," and which consists of the radiation of electrons or minute electrical charges from an incandescent lamp filament. Fleming, an English scientist, made use of this phenomenon in a small gaseous rectifier, a development of which we find on the market in the form of the familiar "Tungar" rectifier.

It remained for Dr. Lee DeForest of New York to improve upon Fleming's work by the introduction of two electrodes into the ordinary electric lamp, thus producing what is known today as the three electrode audion, or vacuum tube.

The operation of these tubes is a little too complex to enter into today, but I may say that they are unique in that they play the three-fold role of detection, amplification and generation. In other words, they will not only set up electrical oscillations at a transmitting station, but they will make them audible at a receiving station, and, in addition, and by a different process, will amplify them to almost any given strength.

This is one of the small audions used for detection and amplification purposes, and it may interest you to know that these are made in San Francisco at the Moorhead Laboratories, which happens to be the largest factory in the world exclusively devoted to the manufacture of these tubes.

This audion here is of very much larger and more rugged construction and is used for transmission purposes and rated at $\frac{1}{2}$ kw. capacity. As many as eight of these have been used in parallel, thus producing at 4 kw. transmitting set.

These tubes are exhausted to a very high vacuum and a potential of 1500 volts D. C. is applied to the plate.

The DeForest Company has a 1 kw. telephone using tubes of this type installed at the California Theatre, and by suitably placed microphone, which is connected to a large horn and suspended in the "fly" galleries, the music is collected from the Herman Heller Orchestra and transmitted, three times a day, many hundreds and even many thousands of miles, to all wireless stations within range. It may interest you to know that an ordinary wireless telegraph receiver is capable of receiving wireless telegraph messages, so that all vessels within a suitable range from San Francisco are receiving two concerts a night from the California Theatre.

The radio telephone finds its greatest use in those places ashore where it is not economical to build a telephone line to connect two points, on account of the very small amount of traffic handled over such a line, so that power companies, and other large industries and public utilities which have widely separated plants or branches, have been installing our radio telephones for communication. As an example, I may say that the Southern California Edison Company has recently purchased three sets, and other power companies are expecting to follow suit. During the war, radio telephones were installed on aeroplanes, battleships, and so on, and rendered very excellent service.

In connection with communication for power companies, it is possible to radiate the radio waves directly into the transmission lines themselves and to talk by means of a sort of "wired wireless."

We now propose to give you a demonstration of a radio telephone in operation. These DeForest instruments here, all of which, as you see, employ Moorhead audions for reception and amplification, will receive music and other signals from the DeForest California Theatre station, and through the courtesy of the Magnavox Company, will be amplified by this Magnavox so as to be audible to you all.

In conclusion, I wish to express my appreciation to my engineer, Mr. McNamee, whose efforts have made it possible to give this demonstration today.

LIBEL CHARGED IN RADIO DISPUTE OF LAWYERS

A WARRANT charging criminal libel was issued against Louis Seidenberg on complaint of James H. Boyer. Both are lawyers with offices at 625 Market street.

The warrant was issued in Oakland by Assistant District Attorney Frederick Donohue.

The charges are an outcome of a dispute over the affairs of the National Radio Company. Boyer, as representative of stockholders, recently laid before the San Francisco grand jury allegations, which are to be considered Monday, including embezzlement, obtaining money by false pretenses and making assessment after the concern was defunct.

Boyer said the libel charge was made in Oakland because the alleged libelous matter was issued in the vicinity of his home there.

The charge is based on a postscript to a letter sent out by the company April 6, calling for a ninth assessment.

Seidenberg is secretary of the company, of which Dr. Adolf Tschumi is president.—S. F. Examiner.



Photograph Courtesy of The Radio Shop, San Jose, Cal.

New Long and Short Wave Regenerative Receiver is Remarkably Flexible

(By E. G. Arnold, Radio "6ZAA")

THE new type "RS 1-24" receiver recently placed on the market is one of the most remarkable pieces of apparatus and also one of the most welcome that has ever been offered to the experimental field.

I have had the privilege of being one of the first to use this new set and as I am so pleased with the work it will do, I feel the desire to let the many thousands of fellow amateurs who are interested in the art, know the merits of this original piece of apparatus.

The type "RS 1-24" receiver, 1-24 you will recognize, means from 100 to 24,000 meters is a remarkable compact set measuring only 7x7x25 inches over-all. One of the features that will appeal to all, besides compactness, is the few controls, which in a receiver of this wavelength range, is a remarkable achievement in itself.

For the past eight years I have searched for a receiver that was flexible enough to tune, without any "holes," to the wavelengths of any station of the world. I have found it in the "RS 1-24," and with no sacrifice on any of the wavelengths covered. The superior variometer method of tuning, employing the wonderful Armstrong regenerative circuit to its maximum efficiency is employed throughout the entire range, which in itself is more than

a guarantee of maximum efficiency and selectivity. A cleverly wired "cam" switch takes care of the three main groups of wave-lengths covered. When thrown to the right the circuits are arranged for amateur wavelengths, 100 to 400 meters, employing the well known Radio Shop design, with a few added refinements. In the center position reception of from 350 to 1000 meters is in order, and remarkable amplification of commercial sparks is obtained. When this switch is thrown to the left damped and undamped stations up to 24,000 meters can be brought in with remarkable ease.

There is another feature of this receiver that will appeal to all. That is a "stand-by" position that may be employed for general "listening-in" purposes and which enables one to pick up stations that otherwise never would be found on account of their sharpness. When you hear your station you can instantly switch over to the tuned side and eliminate interference.

Regarding the operating merits of this set I can truthfully say that it is the combined equal, if not much better, than any individual wavelength receiver ever before put on the market. On amateur and short wave commercial sparks and C.W. it leaves nothing to be desired by the most

exacting "DX" man. Then there is the feature of being able to "hop up" to the long waves without the disagreeable feature of plugging in and out of coils. The tuning on these long waves is remarkably easy and clean cut. Troublesome combinations of tuning have apparently been eliminated and when you find your station you can rest assured that you will find him in the same place the next time you "go up."

While there have been other pieces of apparatus offered to the field with a range covering all wavelengths, it has been my experience that some efficiency has been sacrificed on some section of the range covered, usually on the lower end of the scale. Now this is just where every relay man wants the best efficiency. I was a little skeptical myself about the "RS 1-24" until I had the opportunity to prove to myself that absolutely no efficiency had been sacrificed on any section of the scale.

In addition to the usual run of short wave stations, spark and C.W., I have copied practically all European continental stations, using one tube and the "RS 1-24." What appeals to me most of all is the remarkable flexibility of operation and the positive control of oscillation and amplification attained in this receiver.

TIMELY COMMENT

By B. F. McNAMEE

San Francisco, Cal., May 1, 1921.
Editor Pacific Radio News,
Dear Sir:—

I have just read Mr. Aster's article in the May issue of Pacific Radio News entitled "The Audion Amplifier," and while I agree with him in the main, there are a few statements in this article on which I would like to express a difference of opinion.

Mr. Aster states that "assuming the grid to be entirely insulated from the plate and filament, some of the negative electrons shot off from the filament and attracted to the plate will strike the grid and charge it negatively. This charging will continue (assuming no leakage) until the grid is charged so highly negative as to repel practically all the negative electrons shot off from the filament and hence practically stop the plate current."

Let us say that some of the electrons do get on the grid and charge it slightly negatively. As soon as this charging has amounted to a very small negative potential, it will be sufficient to repel all further electrons from itself. This small negative charge on the grid will slightly decrease the plate current, but will not be sufficient, in any ordinary tube, to practically stop it. The effect which such a small charge will have on the plate current will depend on the structure of the tube, and on the filament and plate voltages em-

ployed. The fact that the plate is positively charged and is drawing electrons from the filament will not cause electrons to collect on the grid. This is clearly stated by Van der Bijl in his book, "The Thermionic Vacuum Tube," page 44, as follows: "The positive charge on the plate does not draw electrons to the grid; it tends to draw electrons to the anode through the openings of the grid."

It is well known that even under the ordinary operating conditions of the vacuum tube there is required a negative potential of several volts to stop the plate current. Now, if a grid having a negative potential of several volts were connected through a galvanometer to the filament there would certainly be a flow of grid current. But Ralph Brown, writing in the September, 1917 issue of the "Physical Review," states: "When a blocking condenser is inserted in the grid circuit no current can flow through it and so the grid must assume the potential at which the grid current becomes zero." So it does not appear reasonable to suppose that an isolated grid would assume such a big negative charge.

When a hard tube is used in a detecting, amplifying, or oscillating circuit with a grid condenser, it is found that if a grid leak is not employed, the tube will not operate due to the high negative charge collected by the grid. This fact does not, however, prove Mr. Aster's statement, because it must be remembered that in this case the potential of the grid is being varied from outside the tube so that it reaches a certain positive value of potential, during which time it attracts negative electrons.

As no grid leak is employed these electrons cannot leave the grid, and the result is a negative potential which may bring the plate current to a non-operative point on the characteristic curve.

Again Mr. Aster states as follows: "Assume the grid to be connected to the midpoint of a resistance connected directly across the filament. The grid will now be at zero potential with respect to the filament. It will therefore neither attract or repel electrons shot off from the filament. In their course from the filament to the plate a few electrons will strike the grid and charge it negatively. This charge will be conducted away to the filament and the grid will remain at zero potential with respect to the filament. The result is that the tube will act as though there were no grid in it at all."

Connecting the grid to the midpoint of a resistance which is connected across the filament brings the grid to the same potential as if it were connected to the midpoint of the filament inside the tube, provided that such a resistance has the same value as the resistance of the filament itself. Therefore the grid is charged negatively with respect to half the filament and positively with respect to the other half. It has zero charge with respect to the midpoint only. Now there will be a flow of grid current as long as the grid is positive with respect to any portion of the filament. Therefore in the present case the grid will attract electrons from half the filament and a grid current will result.

Practically all authorities on vacuum tubes

(Continued on page 385)

THE SPARKING OF LIZZIE PROUT

BY V. G. MATHISON

Author of
"Archibald Augustus Gets a Scare," etc.

"SO you're going back to sea tomorrow, eh," remarked Cunningham, when the waiter had brought the after-dinner coffees and the plates of cooling dessert. "Seems to me you're cutting your summer vacation pretty short, Samuel."

"Yes, an' I'll cut it a lot shorter next time, let me tell you," growled Samuel Jones, elevating his voice above the banging of the jazz-orchestra, to the metallic discord of which a few drooping couples danced dispiritedly in the pervading sultriness. "There's a darn sight more comfort for me aboard a good old tramp steamer than there is driftin' around here among this bunch of stuck-up powder puffs an' dopey ice cream soda drunkards."

"But I thought you were spending your vacation up in the cool mountains, off among the big trees and the speckled trout. A week ago you were all packed up and waving a pink ticket and a bathing suit—Boulder Creek, wasn't it?"

"Boulder Creek's a blasted fake, same's all the rest of the summer insane asylums!" exclaimed the veteran brass-pounder, frowning negatively at a distasteful-looking blonde at a table close by, who seemed to be fishing for an invitation to dance. If you look at a railroad folder an' see a name like Redwood City, you can be sure there ain't a confounded tree as big as a toothpick within a hundred miles—redwood or no other kind; if you find a place called Lakeside, you can figure it's probably a coupla shacks an' some sagebrush out in the middle of the Mojave Desert some place; an' so, likewise, this beautiful Boulder Creek's just about as cool, wet, an' refreshin' as a combination of hell, blue laws, an' prohibition!

"When I gets off the train with my baggage an' my bathin' suit, it was around the middle of the day, an' so blasted hot that even the Africano train porter's tongue was hangin' out about a yard an' a half. Around on the shady end of the little yellow depot I spots an old gink with slack suspenders an' a tobacco-stained goatee, who is chewin' the fat with a couple other old mossbacks, also fitted out with galluses an' soup-strainers. They was all sittin' on a rickety-lookin' express wagon, which has the name 'Halleck's Hotel' painted in crooked letters on the side-boards.

"Where's the rest of the hotel busses, pop?" I inquires of the old buck sittin' up in the bow, evidently the driver of the one-horsepower limousine.

"Hain't no others," he answers, sisin' me up, critical like, an' spittin' out a quid of tobacco big enough to float a battleship.

"Then you can take my grip—but first show me the way to the creek," I says, the sweat streamin' down my face an' onto my collar, which was already as limp as a dishrag an' looked like somebody's cleaned his shoes on it; 'I want to have a swim before I dry up an' disappear like a bottle of booze in a prohibition agent's hip pocket.'

"Th' crick's gone dry," he informs me, calm as you please. "That's it, right there." He points to an old dried-up ditch, with a handful of sand an' a coupla pebbles in the bottom, which runs along close to the depot.

"Sufferin' Judas! You call that a creek! I pants. 'I bet there hasn't been enough water in that ditch to wet a flea's eyebrow since the time old Noah went to sea with his menagerie!'

"Wall, that's jist where yer mistaken, young feller," returns the old buck, his chin-whiskers vibratin' like a kid's jumpin'-jack; 'last December I seen nigh onto two foot of water in that there crick—drowned one of Joshua Perkin's pigs, and raised a helluva ruction—'twas a reg'lar flood!'

"That must 'a been terrible, all right," I snaps, pretty sarcastic. "I don't think I want to stay around a place where there's such rampageous floods. I don't think I could stand it after bein' used all my life to nothin' more'n the little spoonful of moisture that's in the Pacific Ocean. I reckon you can leave my baggage right here, an' I'll grab the next choo-choo back to Frisco!"

"Hain't no more trains till th' end of th' week," chips in one of the other Boulder Creek flood survivors. "Th' next train won't be here 'fore Friday, at the soonest, an' more likely Sattidy or Sunday—she's a little mite late some times, dependin' on how many milk cans she hex ter pick up."

"Good Lord! Today's Tuesday—three day's to stay here," I glooms, moppin' the sweat off my face again. "Well, come on, take me up to the hotel, an' I'll do a high dive into a bath tub, anyway."

"Hain't no bath tub in town," chirrups old Methuselah, 'but if yer want ter swim so gosh durned bad, there's a fine hog waller down there under the railroad bridge!'

"I sees I'm in for stayin' till Friday, anyway, so I lets old chin-whiskers cart me up to Halleck's Hotel. Talk about a hotel—well, I won't try to describe it!"

"Be ye a drummer?" asks the fuzzy bird who runs the dump—a long, lanky old fence rail, with a pair of big iron-bowed spectacles an' a facial hay ranch similar to the lightnin' speed bus driver's.

"No," I answers, 'I'm a brass-pounder.'

"He looks blank."

"Ye're a brass-smith!" he exclaims. "Ye don't look it!"

"No, not that," I says, 'a code-slinger, key-juggler—wireless operator!'

"You don't say!" ejaculates the old hick, gapin' at me like I was a freak out of a zoo. 'Ye're a wireless man on one of them ocean ships! Good gosh a'mighty! Hev ye ever bin shipwrecked? Did ye ever see a cannibal or a sea-snake? Zeke Hoggle drunk a quart of white lightnin' onct, an' he had a whole ruction of cannibals an' snakes chasin' him fer three weeks! He crawled under th' cow barn, an' wouldn't come out till his ol' woman drug him out with a stump puller!'

"Yes, I've had a little experience like that, myself," I remarks.

"When the old gink finally shows me my room, I undresses an' swabs down a little with a wet towel, after which I puts on some fresh clothes an' drifts downstairs again.

"There was quite a bunch loafin' around in front of the dump; an' pretty soon I notices that the old hick who runs the joint is out gabbin' with 'em. They all begin lookin' at me like I was the original Wild Man from Borneo, or somethin' worse; an' I feels like kickin' myself good an' hard for ever tellin' the old magpie I was a brass-pounder. I didn't fancy bein' the object of so much attention, so I goes back up to my shoe box of a room an' lies down. I'd just about dozed off into a nap, when all of a

sudden somebody comes stampin' up the stairs an' starts bangin' on my door.

"What th' hell—" I starts to think to myself, but before I could think anything more'n that, the door flies open like it was struck by a Arizona whirlwind, an' in breezes a big, gawky young gink in overalls an' straw hat. He looks like he's about nineteen.

"I'm Jake Plummer!" he announces, straight off the bat. "Ever'body 'round town's sayin' you're a wireless operator—'s that so?"

"Well, sometimes I try to bluff people into believin' I'm one," I answers, kind of inclined to like kid Jake, even if he did have a style like a cyclone. 'I've worn out about half a dozen first grade tickets, an' a couple of extra firsts along with 'em.'

"Then I reckon mebbe you know more about wireless than I do—a little more, anyway," says Jake, promptly. 'I've got a big sendin' outfit what don't work wuth a cent, an' I come ter ask you if you'll mind to come down ter my place an' have a look at 'er. It ain't fur.'

"Sure thing," I says, glad of somethin' to do, now that it was evenin', an' gettin' cool. I puts on my hat, an' we goes down stairs.

"Is there any other hams in this burg?" I asks, as we steps out into the dusty street.

"There didn't uster be, but there's another one here now—that's jist th' trouble!" exclaims Jake. 'I wisht he'd git a shock off'n his trans-former an' kill hisself, blast him!'

"What's he done?" I asks, surprised.

"He's tryin' to steal my girl, gosh durn him!" flares up Jake. 'You see, there's a girl amacheur named Lizzy Prout up to Bingleton, about thirty-five miles north of here; an' me an' her uster have a high ol' time chewin' th' rag together. Ever'thin' was all right till that gosh-blasted Elmer Pendleton goes an' gets stuck on Lizzie. His ol' man owns th' feed store here, an' he's got about a bushel of greenbacks; so Elmer goes down ter Frisco an' buys one of them big, old-fashioned Marconi two-killowatt synchronous sets what they took offn the ships; an' then he puts up a couple hundred-foot gum poles fer to hank his aerial on. Course, that outfit's drowned my rig clean out—an' Elmer Pendleton's hoggin' th' air, an' th' rag-chewin' with Lizzie. My spark allus uster come pretty weak; an' Lizzie likes that big strong note of Elmer's outfit so well she won't hardly listen fer me a'tall no more.'

"Kinda like tryin' to run opposition to a hundred-horsepower fog-whistle with a ten-cent cow-horn, eh," I remarks.

"Yes, but I hain't told you th' worst of it," continues Jake, bitterly. "Th' devil's to pay fer fair now—th' other day Lizzie sends me an' Elmer each a note sayin' she'd rigged up one of them frame-aerials what everybody's gettin' so crazy about lately; an' she's gonna listen for us on it next Thursday evenin'—day after to-morrow. Th' heck of it is, she says th' first one who kin raise her on her frame-aerial is goin' ter have th'—what'd she call it?—th' exclusive priverlege of workin' with her, hereafter. Th' other guy might's well shut up shop—an' th' other guy'll be me, unless you kin find out what's th' matter with my set, 'cause th' way it is, I hain't got a ghost of a show with that rig of Elmer Pendleton's—I'd like ter chew his neck off, gosh-blast him!'

"That's a hell of a pickle, all right," I agrees, sympathetically, as we go trampin' through the

dust, down the middle of the street. 'I hope I can help you to get your set to percolate.'

"So do I, b'gosh," says Jake, "'cause if you—hey, fer th' luvva Mike, jump!" Before I knows what's happenin', Jake grabs me by the arm an' yanks me to the side of the road; an' about a hundredth part of a second later a big gray contraction goes shootin' by like a cannon-ball, tearin' up a cloud of dust like a tornado, an' roarin' like forty machine guns!

"Sufferin' wildcats!" I splutters, spittin' out a couple shovelfuls of dust, 'what was that? A skyrocket?'

"Nope, that's Zachary Bingdon's air-burnin' ottermobile," answers Jake, in a indifferent tone, like it wasn't nothin' unusual. 'Hafta always be on th' lookout fer it—if it ever hits you, yer done fer.'

"I don't doubt you're right about that," I agrees, 'but what do you mean by an air-burnin' automobile?'

"Runs on air—don't use no gasoline nor nothin'. Zachary invented it hisself.'

"Zachary must be some inventor, then," I remarks.

"Yep, he sure is," says Jake. 'When he tried the ottermobile th' first time, he come tearin' through town same's he done jist now, goin' 'bout twenty miles a minnit—he runned over Sally Spiggins's ol' red rooster an' killed him dead; tore half th' tail off'n Si Biddle's spotted heifer; an' raised a helluva rumpus. It's again th' law to go more'n three miles an hour in Boulder Crik, anyhow, so th' constabule an' the deppity shuriff, an' all th' kids an' dogs in th' town light out after him, an' chases him clean down ter Bungville 'fore he stops. But when they goes to arrest him, he explains he's jist invented a new air-burnin' engine, an' couldn't run it no slower because the air-control wasn't workin' very good yet.'

"When he says that, ol' Hezekiah Hodge, th' constabule, lets him go. "Yuh gotta give a inventor a chance, I reckon," he says, "an', anyway, we kin afford ter hev th' speed law bruk if you're inventin' a air-burnin' engine, 'cause mebbe ye'll bust up that gosh-durned Standard Oil Company, so they'll hafta quit robbin' us ten cents a can fer axle grease!" So now Zachary goes roarin' 'round Boulder Crik fast 's he pleases with th' air-burner.'

"Smelled like gasoline to me," I says, still spittin' dust.

"Well, it don't burn nothin' but air, jist the same," declares Jake, positively. 'Zachary puts fifteen gallons of gasoline in th' tank every mornin' to get her goin'; an' then she runs all day on air—whatcha laughin' at?'

"Nothin'," I says, half-chokin'; 'Zachary's a humdinger!'

"Yep, he's all right," agrees Jake. 'Th' only thing I got again him is he's stuck on Lizzie, too, same 's that doggoned Elmer Pendleton. He goes up t' Bingleton in th' air-burnin' ottermobile ter see her—but she don't care nothin' about him, nohow.'

"By this time we'd reached Jake's place, an' he takes me to a little shack out in the back yard, where he had his outfit. Talk about a wireless set—Jake's was a world-beater!

"First, he had a sendin' transformer that stood about two feet high, an' probably weighed about a thousand pounds—looked like a twenty kilowatt. Jake explains that it used to be a step-down transformer on the power company's line into Boulder Creek, but it burnt out, an' Jake buys it cheap an' rewinds it.

"His high-tension condenser was made out of a pile of window panes an' tin sheets, stacked in a big galvanized iron washtub, filled with lubricatin' oil; an' on top of the condenser was a big clumsy helix with a frame that looked like it had been built out of timbers for a railroad bridge.

"But the most amazin' thing of all was his spark-gap. A big hand-crank an' a lot of gear-wheels from an old emery grinder was hooked up with a small leather belt to an insulated bicycle wheel. The wheel had a lot of brass

screws stickin' around on its rim, all connected together with a piece of copper wire, an' the projecting heads of these screws run between a couple of heavy iron bolts, stickin' up through a board—the stationary electrodes!

"Some gap," I remarks. 'How do you work it?'

"That's easy," answers Jake. 'I'll show you.' After throwin' in a couple of switches, he sits down an' starts turnin' the crank of the emery-grinder. 'I run th' spark-wheel with my left hand, an' send with my right,' he explains. He presses the key, an' a crash of fire goes streakin' between the iron bolts an' the bicycle wheel, roarin' like the spark of a hundred-kilowatt transoceanic discharger.

"Should think you'd go broke buyin' juice for that thing," I says, when he let go the key. 'You must be pullin' a hundred amps!'

"Yes, it uster cost like blazes, but not now," answers Jake. 'I've invented a swell rig t' put on th' meter to slow her down—I allus take it off, though, 'round th' end of th' month.' He points to the meter, which is up on the wall, in the corner. Lookin' up at it, I see a bunch of coils an' magnets hanging' on the front of it. Jake presses the key again, an' the meter-wheel hardly moves.

"Great invention, all right," I says, 'but why don't you just jump a couple of wires around the meter, instead. That would be a lot easier, wouldn't it?'

"But, gosh, that'd be stealin'!" exclaims Jake, horrified.

"Yes, that's so. I didn't think about that," I replies.

"What do you think's the matter with my set?" asks Jake.

"I don't see nothin' the matter with it," I answers. 'Seems to have all kinds of pep.'

"But it hain't got it, though," affirms Jake. 'See here.' He opens his aerial-switch about a quarter of an inch, cranks up the bicycle gap, an' presses the key. With all the roarin' an' racket in the spark-gap, there's only a thin weak spark across the aerial-switch.

"Right away, I seen what the trouble was—the set was out of tune. That washtub condenser was too big for the aerial. I puts Jake to work, cuttin' out half the condenser; then we retune the set. Before we got through, we were getting a big, thick, flamin' spark, over an inch long in the aerial-switch.

"I guess it'll be your turn to boss the atmosphere 'round Boulder Creek now," I tells Jake. 'You've really got about a seven kilowatt outfit, an' when you open up on that Pendleton guy's two kilowatt rig, you'll knock him dead.'

"Jake was tickled to death, but still he looked a little worried.

"I reckon I'm all right now," he says, 'but, b'gosh, I sure hope th' power don't go off to-morrow night, or I'll be out's luck anyhow.'

"How's that?" I demands. 'You're on the same power line as Pendleton—if the juice goes off he won't get none, either.'

"He's got a storage battery an' a motor generator," was Jake's amazin' answer. 'He's all right even when th' power does go flooey—which is about half the time—while I hafta sit an' suck my thumb. But I won't hafta much longer, though, by heck!'

"He points to what looks like some kind of a motor or dynamo, standin' over in the corner of the shack. I takes a look at it, an' sees it's an old worn-out self-excitin' alternator—about five kilowatt.

"I got it cheap down to Santa Rosa from the power company," he explains. 'Pa's sent fer a new gasoline pumpin' engine, an' soon's it comes I'm goin' ter take our old one an' hook 'er up to this here generator. Then the durned power company kin go to blazes!'

"Sufferin' smokes!" I exclaims. 'Are you doin' all this just on account of that Lizzie Pratt, or whatever you call her?'

"She's wuth it, by heck!" declares Jake, hotly. 'You couldn't find another girl like Lizzie in the whole world! Why, at the pumpkin

fair last fall she took first prize fer havin' the reddest hair of any girl in th' county! I bet you hain't got nothin' in Frisco like that!'

"I feels like tellin' Jake he's a damn fool, but I knows from experience it ain't no use, an' I keeps my mouth shut.

"Early next Thursday night I rambles up to Jake's hangout to watch the ether-wreckin' contest. At about seven o'clock Jake cranks up his spark-gap an' starts in.

"L-I-Z, L-I-Z, L-I-Z de J-I-P," he hammers out, about four words an hour.

"What are you doin' with them calls?" I demands. 'Haven't you got a license, an' a regular call?'

"License fer what?" he asks, windin' up the emery-grinder again. Just as he stops to listen in, there is a terrific roarin' outside, an' Zachary Bingdon in his air-burnin' speed wagon goes shootin' down the road like a comet.

"Gol blast that ottermobile!" mutters Jake, clampin' his phone to his ear. 'A feller can't hear hisself think when that durned thins' anywhere inside of ten miles.'

"I was listenin' with one of Jake's phones, an' the noise from Zachary's air-burnin' boat had just about died away when all of a sudden, whango! such a racket comes squawkin' outa the receiver that I though somebody'd blowed a butcher horn in my ear!

"That's Elmer," growls Jake.

"J-I-P de E-R-P," toots the cow horn. "What you done to your set? You burnt my detector half up. Shut her down a little, will you?'

"Go to hell!" screeches the bicycle gap. 'L-I-Z, L-I-Z, L-I-Z, L-I-Z de J-I-P, J-I-P, J-I-P.'

"When Jake stops, we hear the other guy hammerin' out the same thing, 'L-I-Z, L-I-Z, L-I-Z de E-R-P, E-R-P, E-R-P.'

"Then we all listen, but don't hear nothin'.

"She ain't on yet, but she's liable to be any minnit," declares Jake, grindin' his handle, an' bangin' away again. But there was no come-back.

"At ten o'clock J-I-P an' E-R-P were still screechin' an' tootin' their ether-splittin' duet—an' still not a chirp from Lizzie the Red Head.

"B'gosh, Lizzie must be there pretty quick now," mutters Jake, crankin' up the bicycle wheel once more. 'L-I-Z, L-I-Z,' he begins, for the hundredth time, when, bango! off goes the juice, an' the shack's pitch dark!

"There, I knew it'd do that! S'all off!" wails Jake. As he lights an old stump of candle, we hears E-R-P still saxophonin' away, same's if nothin' had happened.

"He's usin' his storage battery, gosh dern it!" sobs Jake. 'Oh, how kin I beat him! How kin I beat him!' He grabs his hair with both hands an' yanks on it with all his might, at the same time gnashin' his teeth like a wild hyena sufferin' with hydrophobia. Then he slumps down in his chair an' bawls like a baby, while E-R-P keeps tootin' away merrily, all by himself.

"Hurrah!" whoops Jake, after a minute, jumpin' up so sudden he nearly startles me outa my shirt. 'I got it! I got it!' Before I can ask him what he's got, he goes rushin' into the house, comes tearin' back in a minute with a five-gallon can of coal oil an' a lantern, an' drags me out through the dark to the barn.

"There's a lot of farmin' machinery in there, but the main thing is a big steam tractor, such as belongs with a threshin' machine. Jake makes for this, an' in about two minutes he's got a roarin' fire going' in the furnace. Feedin' the fire with the coal oil, he gets up steam so quick it would have sure busted any kind of a civilized boiler.

"When steam was up, Jake backs the tractor out of the barn an' around in front of his wireless shack. I wonders if he's gone bugs an' is goin' to drag the whole business off the ranch, but no—he rushes inside, gets hold of that self-excitin' alternator that was lyin' in the corner of the shack, drags it out into the middle of the floor, an' spikes it down facin' the doorway.

(Continued on page 383)

This Department is conducted by the U. S. Radio Inspectors of the Sixth District.
CO-OPERATE!

WITH THE RADIO INSPECTOR

Questions answered by the Inspector.
No names will be printed.
Initial your letters only.

DEPARTMENT OF COMMERCE
Navigation Service
Office of Radio Inspector Custom-house, San Francisco, Cal.

May 10, 1921.

The Editor
Pacific Radio News
San Francisco, Cal.

Dear Sir:—

I wish to call the attention of your readers to the unlawful use of high power for short distance communication. The law states "all stations shall use the minimum amount of energy necessary to carry out any communication desired."

Apparently, a large number of operators, both amateur and commercial, either have forgotten the existence of this regulation or carelessly or willfully ignore it altogether. This law means that you are not under any circumstance to use full power on an amateur set when "chewing the rag" with the small boy in the next block, but in this case a low power tap on the power transformer or even a lamp in series with the primary of same will give a spark powerful enough to be heard within a radius of a few miles, which is plenty of range for ordinary communication.

The same thing refers to ship operators. When near a Naval station, the law requires that the power be reduced to 1 KW when within 15 miles and to 1-2 KW when within 5 miles. Actually, much less power can be used. In most cases it will be found that enough power will be radiated by using one unit of the quenched gap to carry a good deal more than 15 miles.

I have observed a growing practice among operators to use the letter V between the call and the signal when calling a station. No authority exists for the use of any other signal or symbol than DE, which is required by law. The letter V was at one time used as an interval in the Inter-Allied Naval procedure during the war, but this does not constitute any reason for its use in commercial or amateur work.

Yours very truly,

(Signed) D. B. McGOWN,
Asst. Radio Inspector.

Regulation 153, authorizing the renewal of commercial operators' licenses without re-examination where the service record on the back of the license shows three months' satisfactory service during the last six months of the license term, is modified by the addition of the following proviso: Provided that such renewal licenses may also be issued in the discretion of the radio inspector where the service record on the back of the license shows 12 months' satisfactory service during the two year period of the license.

QUESTIONS ANSWERED By THE RADIO INSPECTOR

The following questions were answered by the radio inspector of the Sixth District since the last issue of the Pacific Radio News.

Q. Will a small spark coil transmitter require a license if located at Banning, Calif.?

A. Yes! When the existing Laws and Regulations were formulated the development of the radio art was in a rather crude state, hence it was considered possible to have a small transmitter in operation in isolated sections without interfering with the receipt of signals from beyond the jurisdiction of the state in which it was located, and without transmitting beyond the border of the state. At present time, owing chiefly to the efficiency of the ultra-sensitive vacuum tube detectors and amplifiers, even the small ford spark coil transmitters may seriously interfere with Ship to Shore radio traffic, or with the inter-state radio correspondence of other operators in the vicinity. It is therefore held that the operation of any transmitting device must be licensed in order to comply with the law.

In the above connection much of the pernicious interference complained of at the present time is caused by the unlawful use of spark coils and buzzer transmitters, which may at any time involve the users thereof in very serious difficulty.

Q. Is the Fourteenth Regulation which provided that the minimum amount of power shall be used on all occasions, apply to Amateurs?

A. Yes! Amateurs who have been disregarding this provision in the past have been jeopardizing the continuation of their license, and will, if they persist in the practice, be deprived of any license privilege whatever.

The Commissioner of Navigation has stated, repeatedly, that it was not the policy of the Bureau to continue in force the license of any Amateur who fails to comply with the Laws and Regulations in every respect, hence amateur operators located at out-lying districts whose local correspondence is received at the listening-in stations here, may expect to have their license suspended at any time without additional warning from this office, if it appears that excessive power is being used.

License will not, as a rule, be granted to applicants who are guilty of violating the law by transmitting before applying before applying for licenses.

Q. I have my operator and station licenses. When I applied for my station license I put down a 1-2 KW transformer, which I intended to install later. Would there be any objections to my installing a spark coil until I am able to get the transformer?

A. No, there will be no objections.

INEXPERIENCED RADIO AMATEUR UNKNOWNLY SENDS DISTRESS SIGNALS

DEPARTMENT OF COMMERCE
Navigation Service, Office of Radio Inspector, Custom House, San Francisco, Calif.

May 10, 1921.

Editor "Pacific Radio News"
San Francisco, Calif.

Dear Sir:

On the 6th instant an Amateur in testing out a radio transmitter which he had installed at Bakersfield, Calif., carelessly sent out signals which were interpreted as "SOS", the distress call agreed upon by the International Radio Convention. This call was picked up by other stations and repeated to the Naval Station at Point Arguello, and as a result Naval Vessels were at once dispatched in search of the ship which was supposed to be in distress.

In formulating the existing Laws and Regulations, Congress placed special stress upon the clause prohibiting the transmission of such false or malicious signals by providing a penalty consisting of a fine of \$2,500 and imprisonment not exceeding five years. The charges against the Bakersfield offender have been referred to the U. S. District Attorney at Bakersfield for appropriate action, and it is safe to assume that the punishment will be commensurate with the seriousness of the offense.

This incident should serve as a warning to Amateurs and others who make a practice of using their transmitters for sending out superfluous signals of any character, as such action may involve them in serious trouble, although they may not be aware that their transmission extends beyond the limits of their own cities.

(Signed) J. F. DILLON,
U. S. Radio Inspector.

PACIFIC COAST TO ASIA RADIO SERVICE MAY 1

New facilities for transpacific commercial relations will be available May 1, when the United States will begin operating its naval radio on a commercial basis between this coast and southern Asia.

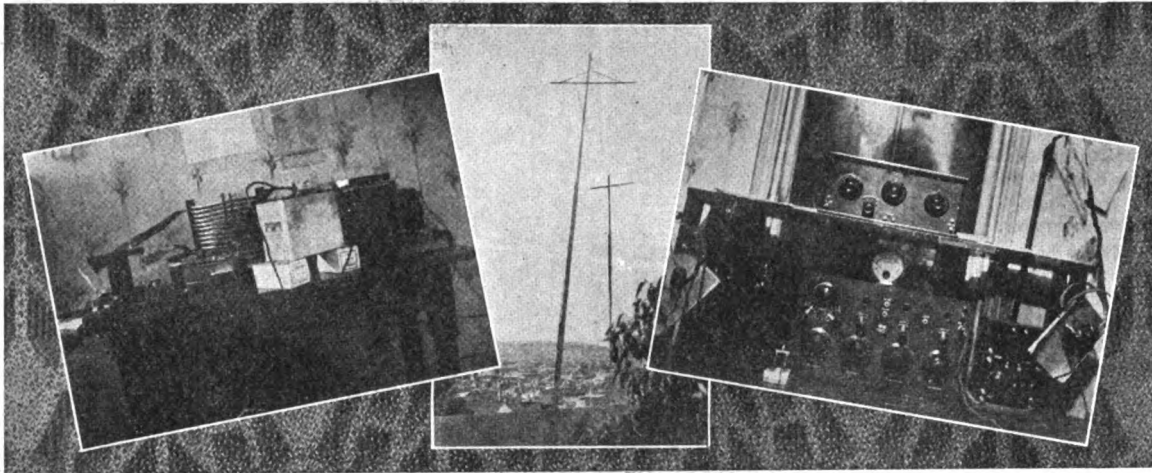
The service will be given in co-operation with that of the French government, which has opened a new station at Saigon, Indo-China, and through use of a new American station at Los Banos, P. I., according to announcement made by Lieutenant Commander S. D. McCaughey of the Twelfth Naval District, whose headquarters are in San Francisco.

The rate from Saigon to any point in America will be 96 cents a word.—San Francisco "Call."

RADIO RECORD MADE

Fifty-four radio messages without a break were received on May 10 by Chief Electrician Maynard L. Hart at the Goat Island radio wireless station, which establishes a new record for this station. The messages came from Cavite, Philippine Islands, a distance of 5000 miles.—San Francisco "Journal."

"6APH"—SAN FRANCISCO'S BEST



6APH sprung-up overnight as did the Tent City of the Yukon. It has only been in operation three weeks and many distance records have already been made. San Diego, Houston, Boise, Seattle and all intermediate points along the West Coast have been covered by the 1-2 K.W. Acme transformer. Expense was no object in the erection of the station and nothing but the best equipment obtainable was put into service. Mr. Clyde C. Young, owner of 6APH, does not believe in fancy work with an accompanying decrease in the efficiency of apparatus. The station has the "plain

spoken" air. Brass tacks and less show is the motto of the owner.

Mr. Young is Chief Operator with the Associated Press in San Francisco and is one of the few pioneer radio men of the West. His commercial radio interest dates back to old "PC," Astoria, Oregon. Young has, without a doubt, the best station in San Francisco, considering power input, location, efficiency and results. The Grebe CR-6 Receiver is used for copying the DX stations. "The first night that I installed the Grebe set I copied enough 'DX' stations to fill an entire page," says Young.

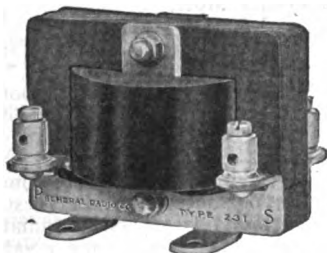
The successful dispatching of 26 messages on the opening night of the station speaks well for the operator and his equipment. The Grebe receiver was also used by Young to receive the boat race news in connection with the California-Washington contest, recently held at Alameda. The race reports were sent by radio from a navy sub-chaser and copied in the offices of the Associated Press.

A radio telephone set will soon be installed by 6APH. Live amateurs of this sort will stimulate the game and make competition keen. We need more of them. Who's next?

New Amplifying Transformer

IN order to get the maximum of results from tubes as amplifiers, they must be used with correctly designed amplifying transformers. Type 231A transformer was built specifically to meet this situation. The primary receives the maximum amount of energy and delivers it undistorted in waveform and at the correct potential to the grid of the amplifying tube.

The core construction is such that there is little tendency for the setting up of external fields, with the resultant howling in the audio frequency circuit. The distributed capacity of the secondary is low, so that the maximum potential is obtained on the grid of the tube.



Photograph Courtesy of Gen. Radio Co.

The primary has a direct current resistance of 1100 ohms, an alternating current resistance at 1000 cycles of 11,000 ohms, and a reactance at this frequency of 66,000 ohms. These figures for the secondary are 5500, 130,000 and 700,000 ohms respectively.

In order to obtain the best results from an amplifying transformer, certain precautions should be observed. Since what is wanted is the production

of the maximum potential, or rather change of potential on the grid of the amplifying tube, it is best to connect the grid to the outside terminal of the secondary of the transformer. This is because the outer portion of the secondary has smaller capacity to ground than the inner portion, due to the proximity of the latter to the primary winding, which is connected to the filament and other low potential parts of the circuit. This capacity effect increases with frequency and therefore reduces the intensity of high notes proportionately more than low ones, thus tending to cause distortion. Howling, or oscillation at audio frequencies, is caused by coupling (either electrostatic or magnetic) of the amplifier grid to some other part of the circuit, and is more troublesome with two or more stages of amplification than with one. If the electrostatic and magnetic couplings are made to oppose each other, the tendency to oscillate is minimized, and when a transformer is connected into a circuit it is worth while to reverse the leads to the primary to see which connection is better. In some cases, the oscillations are above audibility, but the strength of signals is reduced nevertheless.

In an oscillating detector circuit the capacity of the telephone cords (which is of the order of 75 M.M.F.) is often sufficient to by-pass the radio frequency current around the high inductance of the phones, but when the primary of an amplifying transformer is substituted for the phones, it should be shunted with a condenser of a few hundred micro-microfarads or more.

RESEARCH MEN JOIN STAFF OF RADIO FACTORY

Important Developments Being Made in Wireless by Federal Company

TWO noted research men have been added to the personnel at the wireless factory of the Federal Telegraph Company, and are engaged in work interesting and important to the advancement of radio communication.

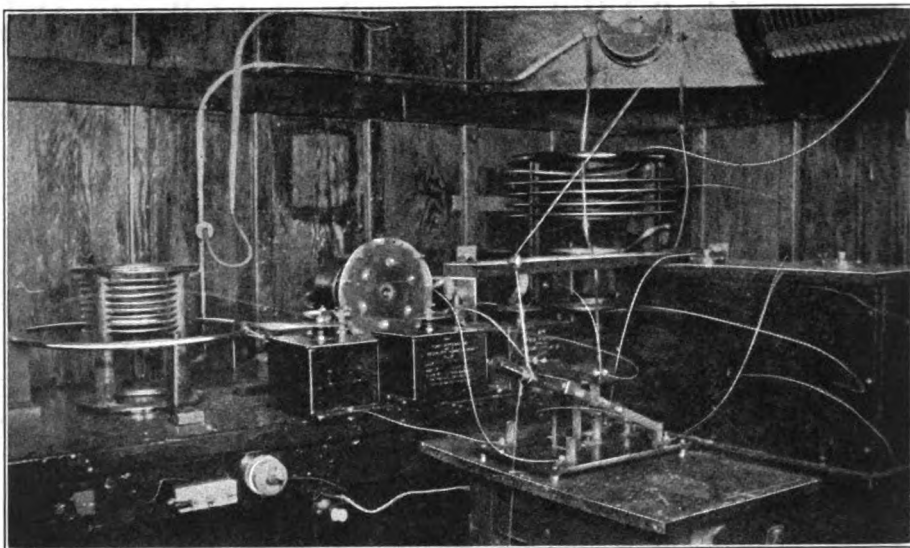
Glenn W. Carpenter, radio engineer from Washington, D. C., is interested in research in connection with the coastwise wireless stations with reference to high speed transmission and reception, and the application of a printing telegraph to radio. While the printing telegraph has been developed for use in wire telegraphy, its perfection for radio work is yet to be accomplished.

Frederick A. Kolster, formerly of the Bureau of Standards at Washington, D. C., who recently joined the Federal Telegraph Company here as research engineer, is working on the development of a uni-directional receiver for long distance reception which will enable signals to be received from distant points without interference from outside sources. The need for the development of this device for radio transmission will be especially felt when the trans-oceanic communication is begun with the completion of the proposed \$5,000,000 radio system to be installed in China, and for which the Palo Alto factory is to manufacture the parts.—Palo Alto "Times."

The new wireless station of the Federal Telegraph Company at Hillsboro was formally dedicated on May 10. A large party of Portland officials and business men were in attendance.

6ZR—One of the Two Synchronous Spark Stations in California

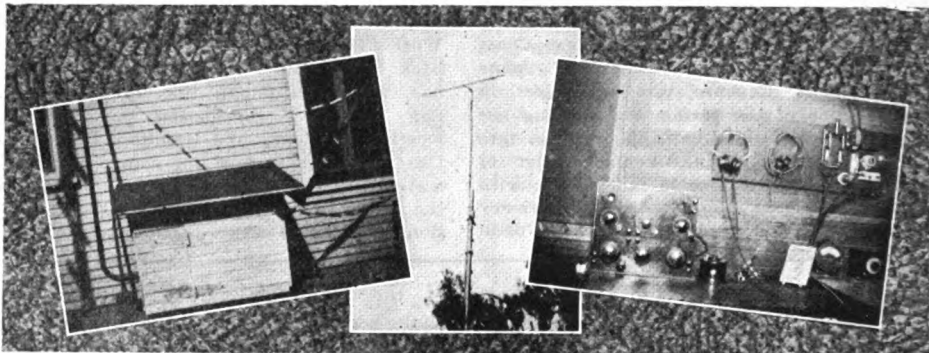
Here we are at last, fellows. Berringer is known from East to West, but nobody has ever seen the photo of his station in print. Take a good look at it and you will see why 6ZR is hammering through in such fine style. Note the absence of useless apparatus. The station has the husky commercial appearance and has seen much hard service. Standard apparatus that will stand the grind is used. 6ZR has two transmitters. One is tuned to 375 and the other to 200 meters. Radio shop apparatus is used for receiving—and a Magnavox to cap the climax.



Radio Station 6ED

Many Western amateurs will be interested in the photos of station 6ED. His transmitter is of the remote controlled type. A 1 KW Acme transformer is used, as well as a 10 point Benwood Gap driven by a 3000 RPM induction motor; home-made oil condenser and Oscillation Transformer. The condenser capacity is 0-01 M. F., although the closed circuit leads are very short. In order to ascertain if the rotary gap motor is running properly, 6ED uses a pilot light. All AC wiring is in conduit.

A home-made regenerative receiver and two step amplifier with Baldy phones do the trick for receiving. The aerial is of the inverted "L" type, 70 feet high at one end and 38 feet high at the other end.



It is 58 feet long, well insulated and of the six wire type. The receiving aerial

is 165 feet long and 70 feet high. One wire only is used.

THE "CW" CLUB OF CALIFORNIA

BY LAWRENCE MOTT

IT gives me a great deal of pleasure to chronicle that I am in receipt of many letters—all of them enthusiastic—with regard to the suggestion that I made in the last number of "Pacific Radio News" for a CW Club. There are seven men—so far—who wish to belong, and who have sent me the details of their stations. These will appear in the next issue. The names are: Assistant Radio Inspector McGown, 6ZZ; Dr. A. E. Banks, 6ZB; Messrs. D. P. Trim, 6FK; J. J. Mahler, 6IY; M. P. Baker, 6FM; A. F. Pendleton, 6UV; Oliver Wright, 6RN; H. W. Dickow and the writer, 6XAD.

A very comfortable beginning, when it is considered that the average amateur is very loath to explore the unknown depths of CW effort!

My co-enthusiasts are of my opinion: that CW has come to stay, and their action bespeaks a spirit of progressiveness that augurs exceedingly well!

In the near future, when a sufficient number of amateurs have expressed their earnest interest—I hope to take up with Major Dillon, inspector in chief, the matter of a CW wave length, and ask him to use his good offices in the behalf of CW work at Washington.

I would again suggest that all who are, or who might be, interested in *The CW*

Club of California—a tentative name that I have tacked on, but that is by no means a final one—to get in touch with me at Avalon, Catalina Island, California, as soon as may be. Details of their stations are most important.

To the Editor,
"Pacific Radio News."

The communication from Mr. Lawrence Mott, 6XAD, in the last number of your esteemed magazine is, in the opinion of the writer, most timely. Without a doubt there should be a regularly defined organization whereby co-operative work and exchange of ideas can be carried out to the best advantage. Mr. Mott's proposed CW Club would seem to promise much. As in all other activities, it would give just as much as we put into it. However unpopular CW may be at the present writing, there is little doubt but that it will in the very near future be the most important branch of radio communication. Everything that can be done to advance amateur CW interests will, therefore, be worth while.

I desire to have Station 6ZB enrolled with others of the CW class and will forward station data requested directly to Mr. Mott.

May I not urge other amateurs working in the CW field to do likewise?

Yours truly,

A. E. BANKS.

Santa Paula, Cal., May 4, 1921.

Mr. Lawrence Mott,
Avalon, Cal.

Dear Sir: I read with much interest your article in the last issue of "Pacific Radio News" and am with you tooth and nail for the betterment of CW conditions. I am probably blocked as bad by broad amateur stations here in Santa Paula as any part of the state, as I am about mid-way between the northern and southern stations.

I have a four tube set with a radiation of .09 amp. and have done some good work when I have been able to get through, on radio phone as well as CW. I am reported QSA in Santa Cruz, Palo Alto and several of the northern stations.

At present I am using HC coils with practically a De Forest hook up, but will change to short wave degenerative soon, with two stage amplification, which should give me much better CW reception. I would consider it a favor if I can help you out in the good cause.

Yours for better CW,

Call 6AOZ
W. L. 200 Meters.

G. M. SANDERS.

*I broke into print today
as crazy as they make 'em,
So please don't get mad, boys,
It's just the way you take 'em.*

*Watch the P. R. N. each month,
I'm surely going to shake 'em.
Everything will be authentic,
Just the way they say 'em.*

By SQUAWK MCGUFF

Ladies and Gentlemen: I wish to announce that our dit-dat friend 6CH claims to have the amplified that will make us turn green with envy. This wonderful instrument marks the epoch in electrical science. It is so sensitive that one can hear the grass grow and the footsteps of a fly sound like a regiment of soldiers marching. It entirely obviates QRN and Mars will have to be included in the itinerary of special working hours.

However, and insofar as this be, 6BN is about to install a station with which he will work 2PL at 12 noon, providing, of course, that he can come to some working agreement with 6CH and Mars. Should these three stations enter into controversial methods at the physiological moment, the most awful ponderanium of the age will result. Earthquakes would probably make their appearance. Debates on the above may be heard daily between 8 a. m. and 6 p. m. at the Conservatory of Hams, scientific rendezvous, Leo. J. Meyberg Co., Radio Telephone Shop and Colln B. Kennedy Co. All are invited. Terrific applause!

6KA has found a remedy for QSS. He tried it on 6APH one morning about 2 a. m. with three kinds of power. For obvious reasons this is a secret for the present. 6APH must have the power warning hereafter as he values his Baldy's. More power to you, 6KA, gosh what a kick.

6AS is having a lot of hard luck regarding location and has finally decided to ask Mayor Rolph of San Francisco, for a location on Twin Peaks. He has tried every place else in town and expects to be with the DX boys shortly. Please QSL if heard in Oakland.

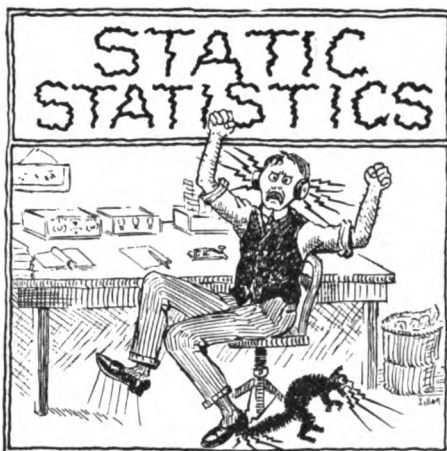
6SN informs me that he is compelled to stop sending at 9 p. m. on account of sparks flying from the sewer pipe on his roof. Who ever heard of a sewer pipe on the roof, for the love of Mike? P. S.: You can get the same brand for \$9 a bottle, boys. HI. HI.

Two Hams in a restaurant.
"I wonder why I can't get any place?"
"Dunno. But listen—put in more ground, lower your antenna, get some radiation, etc., etc., etc., etc., blaaaaa—bla a a a—etc.

"Yeah, I done all that but nuthin' doin a-tall. I can't figure it out."

"Say, listen, you guys," squeaks a heretofore unseen individual at the next table, "A waterpipe is the best ground you can get. Don't it run all over town full of water?" Whassamatah, whassamatah?

6XW, the man that put the air in music (or music in the air) is surely the topic of discussion among the fair sex. One lady



said: "That boy surely has a wonderful voice and I can just picture him as a nice little fat person with a smile that doesn't wear off—and surely he is an Irishman with all that wit." Oh Boy! Mr. Tavers, where will this all end? And say, fellers,—he's a batchelor, too. Watchur step, watchur step. Hello Rosey, Oh I sey, Roseeee e-e-e. Ask him who Rosey is. Heh heh. And ole Tavers is going on a vacation soon. Won't it be a shame if one of those scientific old maids land him? Our usual Wednesday and Sunday concerts will sound like this:—"Good evening, gentlemen. Good Bye!"

That big, broad-shouldered fellow by the name of Highstone was elected Sgt.-at-Arms of the San Francisco Radio Club. "He's a good pick," says Major Dillon, when he installed him at the last biz meeting of the club. The big fellow sized up the crowd, never showed up again. And now we hear that he's on that sea-going hack, Barge 91, or some other name that don't mean much to the Admiral of the navy. Keep your eye on the distilled water bottle for the storage batteries, Highstone. Never forget about the fellow on that tug up in Astoria who started looking for his distilled water and found it in the Captain's room, with a drinking cup hanging to it.

A certain gent (name on request) put up the highest and most elaborate aerial on the Coast. He was a generous soul, too, and had written in advance that he would compile a long list of "DX records busted by me," and send them in each month. But alas and behold—signals came from one direction only. He fumed and sweated, cussed and cried for two months. But why look at the antenna? Wasn't it OK? Didn't he solder all the joints? Sure. Wasn't it a hundred feet off the ground? Sure. But with all hope gone and in a moment of the utmost despair and defecation, he went to the roof to drown away his sorrow looking at the moon. The big round, beautiful sympathetic moon. Tomorrow he would tear the whole thing down. A tear rolled down his static-charred face. He cast a mournful look at the prize antenna.

"Great suffering horn toads and little green apples," he cried, "did I put two leads on my aerial?" They were there—plain as day. One on each end. One lead running to his room—and the other to someone else's room on the next floor. Some people would steal anything. But whoever heard of a man stealing half an aerial? Ye Gawds!

Sergeant Lufkin of the Presidio was flirting with annihilation the other night: Lufkin (on wireless phone)—Hello, Bessey; Hello Bessey; 6ZK, Bessey. Wife (standing near him)—Bessie who? The Sergeant—MISTER Bessey. Wife—Oh!

I highly recommend for 6XW a degree of bachelor of science. After extended research he has discovered two kinds of magnets. One is a blonde, the other a brunette. Hoot, mon!

Well, friends, I have been receiving so many letters of late in regard to theoretical difficulties that it would be impossible to answer them all. So I selected a few of the most important ones and if they are of no help please wire me at once via the underground telegraph company.

1—LIGHT BLINKING AND POWER.

If you have trouble blinking the lights, purchase an alternating current storage battery. This will also give unity power factor. In order to get a synchronous note use direct current induction motors.

2—CURRENT.

Now, if the current is not up to where you think it should be, more currents may be had at the nearest grocer's. Of course, they come cheaper in the bulk.

3—OSCILLATION TRANSFORMERS.

"600" has a very efficient and effective instrument along this line. He wound the tubing around a pickle barrel. This will give a pickled effect and preserve the signals.

Owing to the heavy deluge of inquiries as to what is a meter and what is a wave length, I will attempt to set forth in clear lines so that those not familiar with wireless may understand.

A meter is 39 inches, plus. Therefore, in order to work with 7YA, which is 800 miles air line, tune your set to 7,567,487,981,264.08 plus. But before tuning get an enlarged wave meter. As an example, if 6AET wished to work with 6ABR, he would tune to 7,421,682 meters or two blocks. However, if you wish to go further, I suggest you see the Radio Inspector.

6XW had a serious operation last week and we all send our hearty felicitations on his recovery. He had his counterpoise taken out.

6AF has a fine job at the electric works. While laying some conduit he ran across a pipe. The foreman instructs him to saw the other pipe in half. He did. Well, the long and short of it is that when half way through the pipe 6AF was interrupted. He took a close-up of the planets, called out all the fire departments in S. F. and shut off the town's power. 6AF wants to know who told the foreman it was a water pipe and where in the heck did a water pipe get 11,000 volts? 7DA must have been grounded to it.

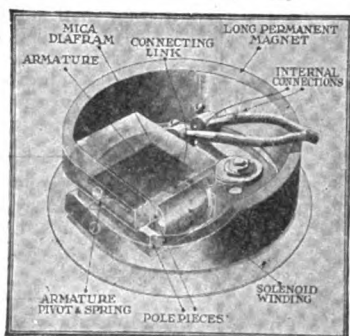
6ZR is the fastest sender in Hamdon. After timing him I am pleased to announce he transmitted exactly forty words per eye-shut.

Bell Boy—A call for Mr. Watt, Mr. Watt!
Clerk—What Watt?

Bell Boy—A. Kilo Watt. Heh, Heh!

P. S.:—Well, so long, fellers. Watch me next month. I'm just getting my second wind. If somebody has something good on anybody let me have it, but it must be authentic. PPS:—Ta. Ta. "30" dit dit dit dah dit dah.

This illustration shows the amplifying mechanism in a Baldwin unit. Note that four pole pieces of single solenoid act on the armature, which in turn connects with the super-sensitive mica diaphragm.



Type "C" Navy standard\$16.50
Type "E" Super-sensitive 20.00
Type "F" light weight 21.00
Units for loud speakers.
Type "C"\$8.50
Type "E"10.00

Equal to two stages of radio amplification

THE experience of leading radio operators,—who have found Baldy Phones "equal to two stages of radio amplification"—clearly indicates the outstanding advantages of using *good* phones. From a standpoint of radio efficiency, you will get "more value per dollar" from your investment in Baldwin Amplifying Phones than from any other item of your equipment. Here are the actual (un-asked-for) letters from experienced radio men, telling of their results with Baldys. They're worth careful reading!

"Have used a pair of Type 'C' Baldys for some time. In naval communication and commercial service. Consider them the most sensitive telephone on the market."
(Name on request.)

"I faithfully believe the use of Baldwin Phones will improve any receiving set at least 50 per cent."
(Name on request.)

"Have found your Baldwin Telephones equal to one and two stages of radio amplification."
(Name on request.)

"In our station it is a common occurrence to place the receivers (Baldys) on the table and copy in daylight the long undamp wave stations with but one V.T."
(Name on request.)

"Equal to one and two stages of radio amplification": Of course Baldys cost more,—but where can you get better value? Where else can you buy amplification equal to the super-sensitive Baldwin mechanism, for so little?

And, the more limited your investment in radio must be, that much more important becomes the use of a super-sensitive and selective Baldwin head set!

The best radio dealer in your town, undoubtedly has a supply of booklets explaining the superior construction of Baldwin Phones, Eldredge Meters and other Firth Specialties. If he does lack a supply, write, mentioning his name and address, direct to

John Firth & Co. Inc., 18 Broadway, New York

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Eldredge Meters
Kolster Decimeter

Distributors for

U. S. Bureau of Standards
Wavemeter
Brownlie Adjustable Phones.

Dealers: Write for advance information on new popular-priced loud speaker.

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RADIO CLUB DIRECTORY

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United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts. San Francisco, Calif. Meetings every Thursday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary.

—adv.

CALLS HEARD BY WESTERN AMATEURS

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

Stations Heard by Paul M. Smith, 701, Powell, Wyo.

5HV 5IF 5LS 5XB 5XD 5ZA 5ZI 6AE 6AK 6AR 6BJ 6BQ 6CO 6CV 6EJ 6FI 6IG 6IK 6JP 6KP 6MK 6OT 6PD 6QR 6RE 6WV 6ZA 6ZG 6ZK 6ZM 6ZN 6ZO 6ZR 6ZV 7AM 7BQ 7CC 7CU 7DA 7EX 7FI 7IM 7IN 7JK 7LG 7LN 7LW 7ME 7PD 7XB 7XD 7YA 7YG 7YU 7YW 7ZG 7ZH 7ZI 7ZK 7AE 7ABX 7AEG 7AEQ 7AEY 7AMB 7AGN 7AIG 7ALO 7AMH 7ARG 7ARX 7ASF 7AUO 7AWD 7BM 7BR 7BW 7BEM 7CA 7EE 7EL 7FZ 7HI 7HT 7IF 7JN 7LA 7LB 7LO 7LR 7XI 7XM 7XW 7YI 7YT 7YW 7YY 7ZC 7ZH 7ZL 7ZN 7ZO 7ZQ 7LW 7OE 7OX 7PA 7SC 7TEY 7UT 7WU.

Calls Heard by Asa S. Keller, Cashmere, Wash., during April

ADM 6AFN 6AGF 6AH 6AIW 6AJT 6APR 6DD 6FH 6IF 6IH 6LR 6LT 6LX 6OH 6QR 6TC 6ZA 6ZH 6ZK 6ZR 6ZX 7AD 7BA 7BC 7BK 7BQ 7CE 7CN 7CQ 7CU 7DA 7DK 7ED 7EX 7FQ 7FI 7FL 7FT 7IY 7JW 7KK 7KM(cw) 7LF 7LM 7LR 7LW 7LY 7MK 7MY 7NL 7OF 7XD 7YA 7YG 7YS 7ZG 7ZH 7ZK 7ZM 8CL. (Camp Lewis field set at American Lake, Wash.)

Calls Heard at Radio 7HN, Eugene, Ore., from March 14 to May 1

6AH 6AK 6AT 6BB 6BP 6CV 6DP 6DD 6EA 6EB 6EC 6EN 6ER 6FH 6FI 6FM 6FY 6GI 6GF 6IC 6IF 6IY(cw) (6JR) 6JS 6KL 6KM 6LX 6MZ 6NN 6OH 6OW (6PR) 6QR 6RT 6SC 6SK 6ST 6TC 6UO 6ZB 6ZI 6ZR 6ZU 6ZX 6AAK 6AAR 6AAT (6ABM) 6ABP 6ABX 6ACR 6AEI 6AFN 6AFM 6AFY (6AGF) 6AGH 6AGM 6AID (6AIW) 6AJM 6AMO 6APH 7AD (7BA) 7BC 7BK 7BQ 7CB 7CE 7CU 7DA 7FI 7FG 7FL 7IN (7IY) 7LS 7LY 7LG 7NN 7YA 7YS 7ZI 7ZM.

Calls Heard by 6FM, Los Gatos, Cal., All CW, ICW or Phone, Month of April

6AAT, 6AFV 6AOY 6BB 6BU 6EN 6EJ 6IT 6IY 6JX 6KA 6OU 6RR 6SN 6TA 6UV 6XAD 6XAE 6XAF 6XW 6ZB 7ZI.

Heard at 6ABQ, San Francisco, on One Tube

5ZA 6AJ 6AK 6BQ 6DD 6DP 6EA 6ED 6EK 6EJ 6EN 6ER 6JD 6JI 6JM 6LC 6MK 6OH 6OW 6PQ 6QR 6RE 6RN 6SK 6ZA 6ZN 6ZU 6ZX 6AAB 6AAK 6ABP 6ADF 6ADL 6AGF 7BC 7BK 7BQ 7CC 7CQ 7GQ 7GY 7IN 7MY and 7ZA.

Calls Heard at 6AME from March 15 to April 15 on a Crystal Detector

6AG 6AJ 6AK 6AN 6AV 6BL 6BP 6CJ 6CV 6DD 6DK 6EJ 6FI 6FT 6HT 6IG 6IM 6IK 6JI 6KK 6KM (spk. and phone) 6LB 6LC 6LH 6LR 6LT 6LX 6MZ 6NQ 6PX 6RN 6RW 6SD 6SF 6SK (6ST) 6SU 6TC 6UR 6ZM 6ZN 6ZR 6ZI 6ZX 6AAK 6AAM 6AJM (spk. and phone) (6AJE) 6ALI 6ALV 6ANB (6AOI) 7BR 7BQ 7CV 7FI 7GQ 7YA 7YN and 7YU.

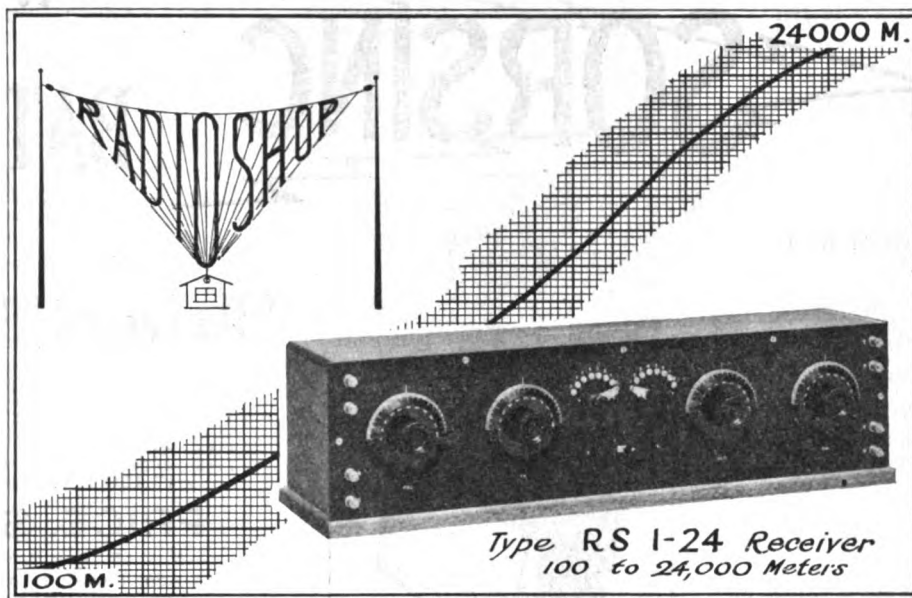
Calls Heard and Worked During Month of March, 1921, by 6ZX, Formerly 6EJ (Only Calls Exceeding 100 Miles are Listed)

(5ZA) (6AAK) (6ABP) (6ACY) (6ADX) (6AGF) (6AIK) 6AJX (6DP) (6ED) (6EF) 6EN (6ER) 6FT (6GP) 6ID (6IF) 6IV 6JT (6KP) 6KS 6MH (6MZ) (6LC) 6OH (6PQ) (6RN) (6SK) (6XZ) 6ZB (6ZH) 6ZM (6ZN) 6ZY (6ZZ) 7AD 7AX (7BC) 7BJ (7BK) (7BP) (7BQ) (7BR) (7CU) (7CW) 7DS 7ED 7FI 7FG 7FL 7FQ (7CQ) (7IN) 7JW (7ZI) (7ZM) (7ZJ) 9YW.

Stations Heard and Worked at Station 6QS, Berkeley, Cal., from March 1 to April 5, One Tube

5ZA (6AK) 6CV (6DK) (6DS) (6EA) (6EB) 6EC (6ED) (6EJ) 6EK 6ER 6EN 6FD 6FI 6FH 6GC 6GI 6GB (6GT) (6GP) (6HC) 6HH 6HY 6IC (6ID) 6IF 6IG 6IH (6IM) (6IS) (6IY) 6JI 6JT (6KA) (6KM) 6KP 6KY (6KS) 6ML 6LC (6MH) 6OC 6OH 6OL 6OW 6OZ 6PC (6PO) 6PQ

(Continued on page 382)



Something Concise:

Concentrated essence of efficiency, the new RADIO SHOP type RS 1-24 receiver. The latest application of regenerative tuning to a range spanning every wavelength used in radio communication throughout the world.

Haven't you ever tired of the "QRM" on amateur wave-lengths and wished for a receiver that would bring in the commercial ships and long wave damped and undamped stations, without the trouble of changing wires and plugging in and out of numerous coils?

THIS IS IT! 100 to 24,000 meters, without a "dead spot," all in one cabinet! Variometer tuning applied to the entire scale with the resultant ease of control of regeneration and oscillation. Circuits so synchronized that troublesome "combinations" of tuning are entirely eliminated, making definite adjustments and reliable reception an assured thing, and the RS 1-24 the ideal receiver for all wavelengths, with absolutely no sacrifice of efficiency on any particular wavelength. A "stand-by" arrangement is also incorporated that will broaden tuning, when so desired, for general "listening in" work.

The very popular RADIO SHOP short wave receiver construction applied to wavelengths below 1,000 meters assures maximum selectivity and efficiency for amateur and short wave commercial spark and C. W. reception. Wavelengths from 1,000 to 24,000 meters are taken care of by an entirely new application of the variometer principle, which has already been employed in the RADIO SHOP long wave receiver, described in previous advertisements. The result:—

SATISFACTION

A few mechanical features that will appeal to the most exacting:—Banked windings. Dials that run true. Heavy bus-bar wiring. Non-shortening variable condensers. Grained, engraved, Formica panel. Interior as well as exterior workmanship of the highest possible order. **NO SEALS.** We are as proud of our interior as of the outward appearance and want the purchaser to know just as much about the apparatus as we do.

The "RS 1-24" carries the same "money back if not satisfied" guarantee that applies to all RADIO SHOP products. So far we have never had to live up to this guarantee, and enviable record to say the least.

"THE SET THAT YOU WILL EVENTUALLY BUY"

Licensed under Armstrong's Regenerative Patent and applying this unapproachable circuit to its maximum effectiveness.

THE RADIO SHOP type RS 1-24 Receiver is the most efficient and effective radio tuning device ever built.

Price F. O. B. San Jose.....\$100.00

In ordering please specify whether Oak or Mahogany cabinet is desired.

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THE RADIO SHOP

San Jose, California

Variometers, \$5.75. Vario-couplers, \$4.75. A few still are left.

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"B"
BATTERY

22½ VOLTS

FOR RECEPTION AND

Size 4½"x5½"x8"

Each cell 4" long x 1½" dia.

Moisture proof—Rope handle.

Heavy stranded wire terminals.

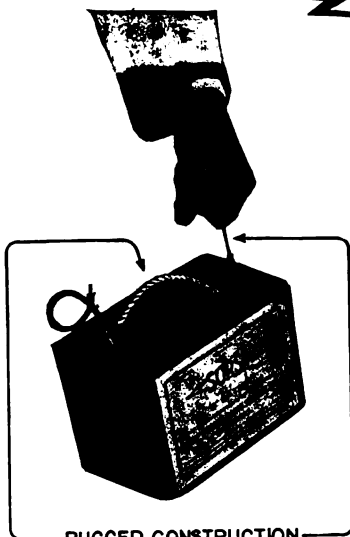
Net weight 12 lbs.

Will deliver 4 milliamperes for 1600 hours on Intermittent service.

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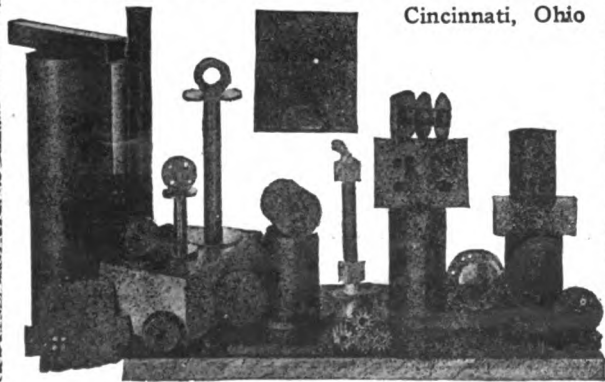
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THE MAGNETIC AMPLIFIER

(Continued from page 367)

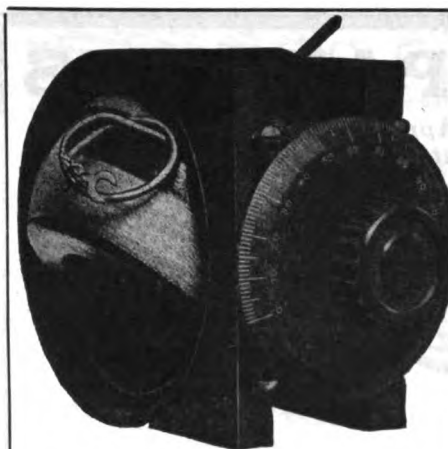
iron relay or magnetic amplifier, particularly the smaller types and types used in receiving circuits (some experimental work has really been done in connection with this latter application), it is a most important consideration to minimize absorption losses in the iron composing the magnetic circuit. If sheets are used, only the thinnest obtainable must be selected, and each component part of the core must be insulated from the next. Needless to say, insulation other than that provided by the oxide coating must be used. For general designs of low powered relays, enamel insulated soft Norway iron wire, about 32 to 38 gauge, if obtainable, will be found most satisfactory. Insofar as the writer is aware, the insulated article is not obtainable from stock, but it can be obtained on order, or manufactured from bare iron wire by the user. It adapts itself quite well to shapes commonly called for in this work, and on account of its dimensions, greatly minimizes eddy-current losses, which are so pronounced in sheet cores.

Theory of the magnetic amplifier. This may best be explained in the words of E. F. W. Alexanderson, who is responsible for the original application of this device to the control of radio frequency currents. "If two windings (e. g., A and B in Fig. 3) are related to each other and a common magnetic structure as shown in Fig. 3, it is apparent that there is no direct transformation of energy possible from one winding to the other. Each turn in the controlling or exciting winding B include both the positive and negative branch of the flux produced by the A. C. winding, A, and hence there is no voltage induced in B. The current in either winding A or B, on the other hand, influences the permeability of the common magnetic material; and, therefore, changes the inductance of the other winding. If a current flows in either winding sufficient to saturate the iron, it is thereby rendered practically non-magnetic and the inductance of the other winding is reduced to the value it would have if the coil included only air. If, on the other hand, a current flows in the other winding which gives a magnetic-motive force equal and opposite to the first, the iron is rendered magnetic again. Inasmuch as the two branches of winding A are wound relatively opposite to winding B, the one branch will oppose the ampere turns of winding B on one-half cycle and the other branch during the next half cycle. In order to have any large flux variation in winding A, the opposing ampere turns must be at least equal to the ampere turns in winding B. The relation of currents in these windings is substantially the same as that between the primary and secondary current in a transformer, although in this case, one is an alternating and the other a direct current on a current of a different frequency. It is thus obvious how the current in winding A can be regulated in proportion to the controlling current in winding B.

CALL LIST CORRECTIONS

The listed call, 6AML, of the station operated by F. Burgess of Agnew, Cal., should have been 6ALM.

Calls heard by 6AIK as published in our May issue should be credited to 6AID.

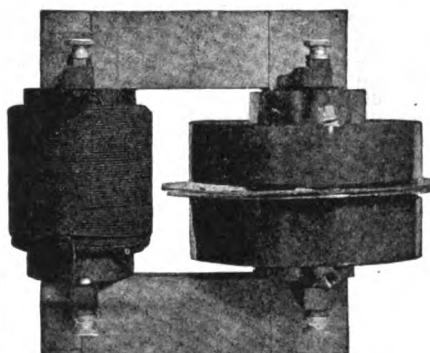


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry maximum to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

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Price \$14.00

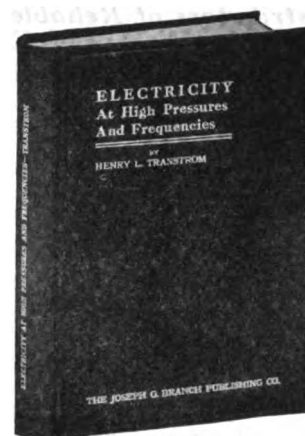
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No. 4 Variable condenser, .0006 mf., unmounted, with new dial.....	4.25
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Type C "Navy Standard".....	\$16.50
Type E "Super-Sensitive".....	20.00
Type F "Latest," small and light.....	21.00
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No. CR-3 170-680 meters "Relay-special".....	\$65.00
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No. 56 2000 ohm phones with new headband, just out.....	5.00
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No. UV-200 Detector tube.....	\$ 5.00
No. UV-201 Amplifying tube.....	6.50
No. UV-202 5 Watt power tube.....	8.00

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Type "R" 1 K. W. Power transformer.....	\$40.00
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Type "R" 1/4 K. W. Power transformer.....	14.00
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No. T-2 Oscillation transformer.....	10.00

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No. 181 Cap. feed back circuit.....	\$ 7.50
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Radio Telephony, by Goldsmith.....	2.50
Robinson's Manual of Wireless, by Robinson.....	2.50
Consolidated Radio Call Book, Just out.....	1.50

CALLS HEARD

(Continued from page 378)

6QR 6RR (6SK) 6TC (6TV) 6TF 6TL
6UM 6UO (6VX) 6WH 6ZH 6XZ 6ZO
(6ZN) 6ZX 6ZA (6AAK) (6AAT cw ana
spk.) 6ABP (6ACA) 6ACY 6ACX (6AID)
6AIC 6AIK 6AIW 7AD 7BH 7BK 7BJ
7BC (7BP) 7BQ 7CC 7CN (7CU) 7CW
7CG (7DS) 7ED 7EX 7FI 7FL 7FQ 7HN
7HF 7JR 7JW 7KM 7LS 7IN (7ZI) 7ZK
(7ZJ) 7YA 7YK 9OE 9YW.

Calls Heard by 6AJH, San Ysidro, Cal.
(San Diego County).

Anyone hearing 6AJH please QSL.
5JF 5XD (5ZA) 6AE 6AH 6AK 6BX(cw)
6DP 6EA (6ED) 6EK (6EN) 6ER 6FI
6GH (6HY) 6HR (6IF) 6IL 6IM 6JJ 6JM
(6KA) 6KM 6KP (6LC) 6MZ 6OC (6OH)
(6OW) 6PO 6PR 6PQ (6SK) 6SR 6TH
6TU (6TV) 6UK 6VX 6WH 6WZ 6ZA
(6ZH) 6ZK 6ZN 6ZR 6ZT 6ZU (6ZY)
(6ZX) (6ZZ) (6ABP) 6ACA (6ACY)
(6ADX) 6AFN (6AGF) (6AHQ) 6AHY
6AJE 6AOM 7CU.

Calls Heard by 7CT, Portland, Ore.

6AC, 6AK, 6DK 6DP 6EJ 6EC 6EX
6FH 6GY 6HC 6KM 6KL 6LX 6OH 6PR
6QR 6TR 6TC 6ABM 6ABW 6ACA
6AGF 6ZM 6ZR 6ZU 7BC 7BH 7CE 7CC
7CW 7FI 7FU 7IN 7ZM 7YA. Anyone
hearing 7CT please QSL.

Calls Heard by Kenneth Hill (6HA) at

Eureka, Cal., During Month of April
6ACM 6ACF 6AF 6AGF 6AGR 6AH
6AJE 6AJR 6AL 6AN 6AP 6ATT 6AU
6BA 6BS 6CH 6CM 6DK 6DM 6DP 6DW
6DY 6EA 6ES 6FH 6FI 6FU 6GW 6HC
6HF 6HH 6HX 6IT 6JI 6JR 6KM 6LC
6LR 6LX 6MZ 6OH 6OW 6PD 6PR 6QR
6RH 6SA 6TB 6TC 6TP 6TV 6VK 6VM
6XR 6YN 6ZA 6ZB(cw) 6ZH 6ZM 6ZN
6ZR 6ZT 6ZU 6ZX 6ZY 7BA 7BC 7BH
7BK 7BQ 7CC 7CU 7CW 7DA 7DI 7HN
7IY 7LN 7LY 7NN 7OR 7YA 7ZJ 7ZI
7ZX. Anyone hearing me, please write.

Calls heard at 6CH, 1737 Union Street,
San Francisco, Cal., after 11 p. m.,
From April 1st to May 6.

5ZA 6AK 6AID 6ABM 6AGH 6ACY
6AIK 6ADL 6ANG 6ALB 6ALA 6ABM
6ACR 6AAU 6AFN 6AR 6DP 6DA 6ED
6EN 6EB 6FH 6GP 6IS 6IC 6IF 6LU 6LC
6MZ 6OW 6QR 6RN 6SK 6TV 6VX 6ZH
6ZA 6ZU 6ZX 7AD 7BK 7BP 7CU 7CU
7CW 7DA 7FI 7HF 7JW 7NN 7YA 7ZN
7ZM.

New Calls Heard at 6ACM, Berkeley
Calif.

6DD 6DS 6FT 6KM (6KS) (6LC) 6MH
6MZ 6OL 6OW 6PR (6RR)—CW 6WH
6ZH (6ZU) (6ZX) 6AAD 6AAP 6ABM
6ABX 6ADA 6ADL 6AEL 6AEY 6AGC
(6AID) 6AJE 6AOD 7BA 7BQ 7CU (7HN)
7MY 7NN 7ZR 9ZN. Anyone hearing
6ACM please QSL.

Heard at 6AUB San Diego

5ZA 6AK 6AQ 6DP 6ED 6EN 6ER
6GE 6HI 6ID 6JM 6KA 6KP 6LC 6MK
6OC 6OH 6OW 6SK 6UM 6ZA 6ZH 6ZN
6ZR 6ZU 6ZX 6ZZ 6AAK 6ABP 6ADX
6AIL.



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return your money without a quibble.

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COMPANY
Needles, Cal.

THE SPARKING OF LIZZIE PROUT

(Continued from page 373)

Then he gets a small leather belt from the barn, slips it over the generator pulley an' around the drivin' pulley of the steam engine on the tractor. Next he gets out some insulated wire, an' hooks the alternator to his transformer an' key, style a la grapevine. This done, he backs away the tractor, easy, till the belt is tight an' true; then he throws out the drive an' starts the steam engine which is belted to the generator. Talk about fast work—I never seen a generatin' plant put into commission with such speed in my life!

"Will you do the sendin' while I stay out with the tractor an' keep up steam?" asks Jake, throwin' down his hammer, an' moppin' his face with his red bandana.

"Sure, go ahead," I answers; an' I sits in. I speeds up the bike wheel, an' begins to pound away. The candle went out, but the room was lit up by the purple fire that roared in the bicycle gap like an eighteen-inch gun, while brush discharge squirted an' glowed all over the place.

"The generator had altogether too much voltage for the transformer, which soon gets like a red-hot stove. The transformer was hard up agalnst the oil-condenser; an' it heated up the oil so much that pretty soon it starts to smoke. I keeps hammerin' away, never lettin' up for a second, because I knows it's no use to try to listen in with that old rattle-trap of an alternator hangin' away behind by back. I figures I'll keep E-R-P drowned off the map, anyway. In fact, the way the juice was flyin', it looked to me like I ought to be bustin' up every con-founded station on the Pacific Coast!

"So there I sat, crankin' the emery-grinder with one hand an' poundin' brass with the other; the room filled with a purple glare from the juice that was crashin' onto the bicycle wheel, screechin' like forty wildcats with the itch; brush discharge shootin' from every inch of metal; the heat from the sendin' transformer burnin' the hide off'n my legs, an' the smoke from the hot lubricatin' oil in the condenser risin' at my elbow; at my back the old generator rattled an' shook; outside in the dark the steam tractor clattered an' clanked, an' sent smoke an' fire flyin' a mile high as Jake piled pitch pine into the furnace.

"This keeps up about half an hour, an' then, all of a sudden, plop! the sendin' transformer takes fire. I sings out to Jake, an' we try to drag away the wash tub condenser full of smokin' oil, but, instead, we only upset it, an', whish! the oil flashes up, fillin' the shack with a solid sheet of flame! We makes a dive for the door, an' about ten minutes later the whole blasted shack is nothin' but a roarin' mass of fire.

"'Funny nobody comes,' mutters Jake. 'Generally the whole town comes runnin' to a fire—holy Jerusalem, look!' He points over across the village to a big, bright blaze, a good deal like our own, with crowds of people rushin' around it.

"Two fires to onct in Boulder Creek—jumpin' Jehovah, whadd'ya know about that!"

"About twenty minutes late, the other blaze was dyin' down a little, an' then all the town comes rushin' up to our campfire. At the head of the crowd is a long, lanky young fellow, who Jake seems to take particular notice of.

"Well, Elmer Pendleton, I reckon you feel happy watchin' my outfit go up in smoke, eh?" spat Jake, glarin' at him.

"That's a mean thing fer you to say, Jake," exclaims the other gink, in an injured tone. 'Min's gone, too!'

"Wh-what!" splutters Jake, 'Is that your shed burnin' over there!'

"Yes. While I was sendin', there comes a terribul kick-back, or somethin', an' the next thing I know the whole gosh-blamed woodshed was afire—we're both in the same boat!"

"Just then there was a roar an' a racket like

(Continued on page 388)



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VOLTAGE AMPLIFIERS

(Continued from page 366)

used although some well constructed india ink resistances have been found satisfactory. Good resistances with firm, non-microphonic contacts are absolutely essential or the amplifier will "hiss," "howl," be very "noisy" and a total failure. The connections for a reactance coupled radio frequency amplifier are very similar to a resistance coupled type. Referring to Fig. 6, the only change necessary to convert this to a reactance coupled type is to replace the resistances, (R), by a coil and condenser as shown in Fig. 5. This arrangement is to be preferred for 200 meter work as it is absolutely free from capacity troubles and "noisy" resistances.

The audio frequency reactances shown in Fig. 6 may be made as follows. On a core of fine annealed soft iron wire $\frac{1}{4}$ -inch diameter by $2\frac{1}{2}$ inches long, wind with No. 36 or 38 enameled wire for a depth of $\frac{1}{2}$ -inch and a length of 2 inches.

A transformer should always be provided in the output circuit for two reasons. (1) It is best to keep the direct current out of the telephone receivers in order not to ruin their permanent magnets. (2) The impedance of the average telephone receiver used for radio work is not high enough for the plate circuit. The output impedance of this transformer should be equal to the impedance of the telephone receivers. Hence if a variable number of receivers are to be used suitable taps should be brought out from the transformer secondary so that the total impedance of the receivers in use can always be matched. This arrangement makes it unnecessary to use high resistance receivers as high grade low resistance receivers will function equally well provided transformer and receiver impedances are properly matched. Transformers for this purpose should never be of the open core type, but should be designed for the minimum of magnetic leakage. The toroidal transformers (ring type) are the very best, but complicated machines have to be used to wind them and they are therefore ruled out. The so-called "shell type" is the next best. It is very difficult to give actual dimensions for the construction of a transformer of this type unless one knows the plate resistance of the tube and the impedance of the telephone receivers with which the transformer is to be used. The following general suggestions may be of value. The pri-



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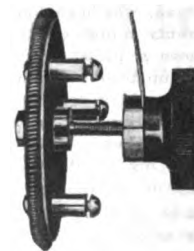
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mary should be about the same as that of an amplifier transformer primary suitable for the type of tube to be used. The secondary should have about one and one-half times the number of primary turns and be provided with about six or eight taps starting at a point having the same number of turns as one-half the primary. The taps should be evenly spaced from the first tap to the end of the winding. These suggestions for the secondary are only a rough guess, but may serve as a guide in designing a transformer of this type. The telephones should be connected to the secondary taps which will give the longest signals.

In the next article power amplifiers will be discussed.

TIMELY COMMENT

(Continued from page 371)

have adopted the convention that all potentials in the vacuum tube are relative to the negative end of the filament; the grid is said to have zero charge when connected to this point.

In ordinary tubes there is one certain value of grid potential which will bring the plate current to the same value it would have if there were no grid in the tube. The value of grid potential necessary to do this must be such that it will compensate for the screening action of the grid, and this required potential will vary with the distance from grid to plate.

Therefore it is not reasonable to assume that this potential is always the same as that of the midpoint of the filament.

If it is understood that only "Hard Tubes" are considered in the above.

B. F. McNAMEE,
Chief Engineer,
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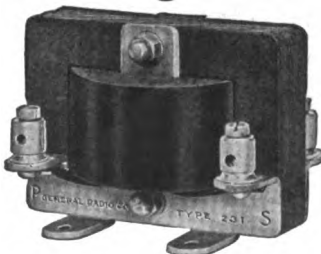
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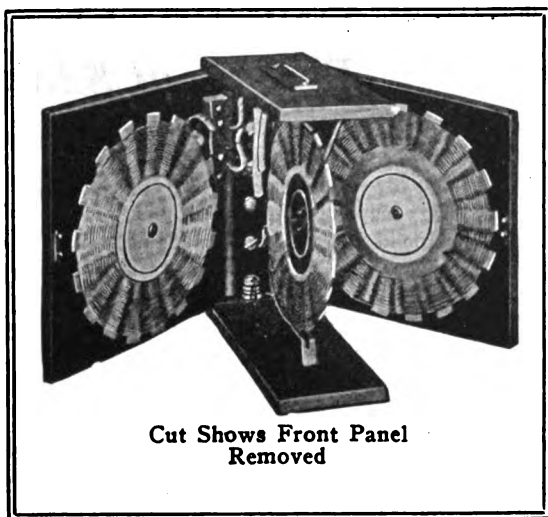
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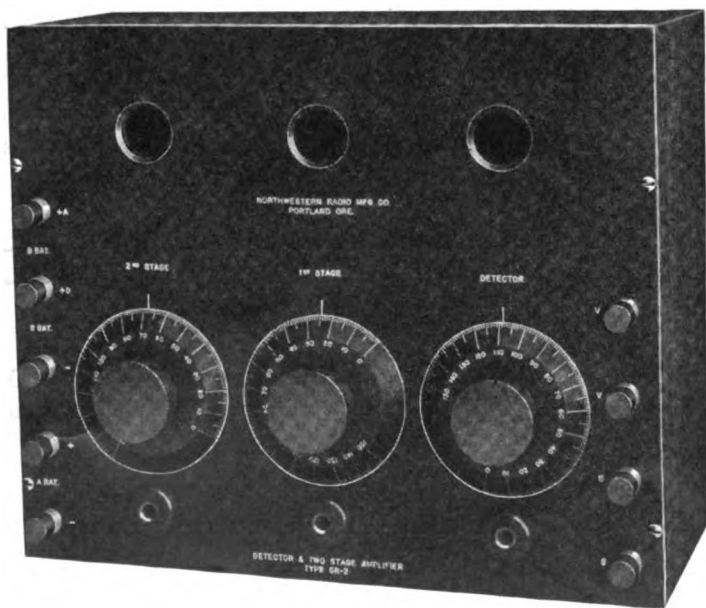
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RADIOTORIAL

(Continued from page 365)

Radio Inspector should be stationed in Los Angeles, whose district shall be that of the Southern portion of the State—in precisely the same way that there is a Fish and Game Commissioner there resident who has all southern matters under his direct supervision.

I would further suggest that an amateur council of five—or three—be appointed by the Radio Inspector-in-Chief. This council to consist of southern operators who, by their work and general efficiency, have proven their radio worth. Let this council act as aid guardians and log all wilful QRM, illegal uses of wave lengths and call letters. Then let these findings be reported to the Inspector when he comes on one of his trips, and he will have something to work on.

The charge may be set forth by amateurs that this is setting spies among us. My answer is this: ANY method of controlling certain turbulent, illegal and refractory operators would be more than welcomed by the sober-minded, earnest members of the radio fraternity in the Southland!

Amateurs ask the Government for everything under the sun, and when the long-suffering authorities give them

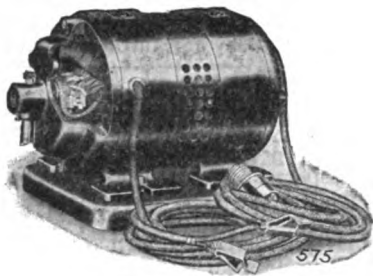
almost everything, they abuse these extended courtesies shamefully!

Why should not the amateur be as rigidly controlled in his operating as are the commercial operators? There is a short shift, indeed, do they cause unnecessary QRM, or transmit needless messages! I fail, utterly, to see why the amateur—and I am an enthusiastic member of that clan—should be permitted to do as he selfishly pleases, out of sheer gratification of his own personal desires!

And finally I appeal to the REAL operators among us—the fellows who want to improve the work and incidentally themselves—to use their influence for the all-round betterment of radio conditions.

Surely we do not wish to have Washington clamp down the lid, with far more severe regulations, saying: "We tried to treat you as men, with the intents and ideals of men. We find that you disregard the laws and conventions; that you act as a lot of school children, when the teacher's back is turned, and for these things it has been decided that more stringent rules shall be put into effect."

In the hands of the amateurs themselves lies the future of their radio work!

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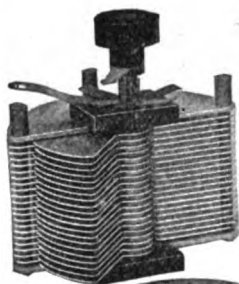
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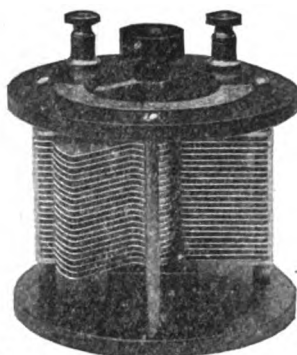
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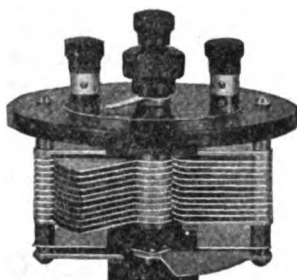
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13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.

With Style No. 1, we will, if desired, furnish 3 inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial.

Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave., Springfield, Illinois

THE SPARKING OF LIZZIE PROUT (Continued from page 383)

a battleship firin' a broadside, an' that air-burnin' speed-boat comes dashin' up alongside us. By the light of the fire, I sees a nutty-lookin' rube at the wheel, an' sittin' beside him a freckle-faced young female with a little pug nose an' fiery red hair.

"'Jumpin' Jerusalem, there's Lizzie with Zachary Bingham in his air-burnin' ottermobile!" exclaims Jake, astonished.

"'Oh, hello there, Jake an' Elmer!' hollers out the red-headed outrage, in a voice that reminds me of somebody scrapin' a file across the edge of a tomato can. 'I jist come down to tell you that I fergot all about listenin' fer you this evenin' on my new frame antenner. Zachary come an' took me fer a ride down ter Bungville, an'—a—tee-hee—we've jist got married!'"

Los Angeles, Calif., May 3, 1921.
Editor "P.R.N.,"
San Francisco.

Dear Sir:—

Just received another long distance "call heard" card.

This one is from "9KL" of Spring Valley, Ill., who reported the reception of Station 6EA.

Yours truly,
H. C. SEEFRED.

Almost a thousand readers of "Pacific Radio News" have received prizes in the form of radio apparatus for securing subscriptions. If you are not already in the swim, write today for full particulars.

WAR DEPARTMENT TO TRAIN RADIO AMATEURS

Plans for the training of amateur radio operators and their induction into service in case of a war emergency are being formulated by the War Department, according to information received from Washington by headquarters of the Ninth Army Corps area here. The plans provide for the recognition of organizations of amateurs within each army corps area.—San Francisco "Chronicle."

LOOK

A Yearly Subscription to QST and Pacific Radio News for \$3.25. You save 75c. Pacific Radio Pub. Co., 50 Main St., San Francisco, Calif.



BURGESS "B" BATTERIES

ARE THE NOISELESS KIND—made with and without taps

Send for catalogue giving sizes and prices

BURGESS BATTERY COMPANY

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Wesrad Mail Order Service

"EVERYTHING IN RADIO"

Prompt Delivery

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SEND FOR OUR LATEST
STOCK BULLETIN AND PRICE LIST

Western Radio Electric Company

550 SO. FLOWER STREET

LOS ANGELES, CALIF.

For Short-Wave Results—

This combination makes phenomenal distance work an every-day occurrence in your station.



GREBE RADIO apparatus is licensed under the original Armstrong and Marconi patents.



**Relay Receiver (Type CR-3)
and
Detector and 2-Stage Amplifier
(Type RORD)**

This is the famous combination that proved its merit in the relay tests some months ago. It makes a wonderful team both for ease and flexibility of operation, and what is far more important—real results!

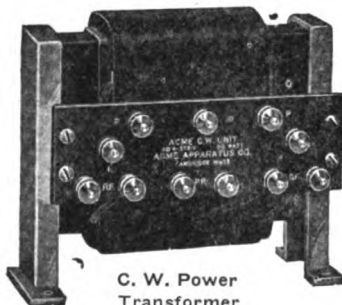
Ask to see it at your dealer's today.

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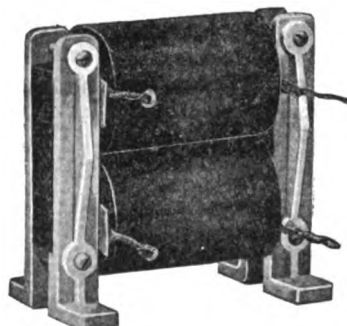
Kelly & Phillips, Brooklyn, N. Y.
Klaus Radio Company, Eureka, Ill.
Manhattan Electrical Supply Co., New York, Chicago, St. Louis.
Leo J. Meyberg Co., San Francisco, Cal.
Newman Stern Co., Cleveland, Ohio
P. D. Pitts Co., Inc., Boston, Mass.
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Western Radio Electric Co., Los Angeles, Cal.

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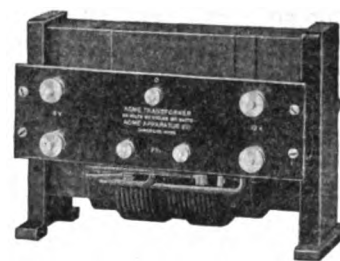
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C. W. Power
Transformer



1 1/2 Henry Choke Coil



Filament Heating
Transformer

C. W. Power Transformers

For use with rectifying devices or for A.C. directly on the plates of power tubes.

SPECIFICATIONS 110 volts 60 cycles				
Output	Filament voltage	Filament current	Plate voltage	Plate current
50	10	2.5	350	100
	Two filament windings			
200	12	5	250-550	200
	Two filament windings			
500	0	0	1000-1500	400
	No filament windings			

The Apparatus with a Guarantee.

ACME APPARATUS CO.

Transformer and Radio Engineers and Manufacturers.

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For use in ironing out pulsations and for modulating single and double 150 MA and 500 MA capacity.

Filament Heating Transformers

Allow the use of A.C. for power tube filament heating.

Specifications 110 volts 60 cycles		
Output	Secondary voltage	Secondary current
75	8-10	7
150	10-12	13

Modulation Transformers

Give maximum modulation without distortion.

Your dealer will be glad to show you these Ask for bulletin

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Room 303

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Tresco Ten \$ Tuners

When you think of tuners say TRESKO.
One for every need and wave length.

Presume you would like to hear something of the luck I have had with your "TRESKO tuner", which I bought of you some time ago. I am more than pleased with it. If I could not get another, I wouldn't take a hundred dollars for it, and it is certainly the best tuner I have ever used. All stations of from 4,000 to 20,000 meters come in loud and strong, and without amplifier. Another feature is, that it will work right through static, with a little adjustment. Since owning this Tuner, I haven't "closed up" on account of static.

J. B. ELLIS, Rancho De Casa Loma, Cochise, Arizona.

CATALOG FREE

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Send For This Book

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Here is a book that will be invaluable—it will help you get more pleasure from your radio work—it will help you purchase the best equipment at lowest prices—and it comes to you for only 35c in stamps. Send for a copy NOW—your copy will be sent by return mail. And your 35c will be refunded with your first \$1.50 purchase from us.

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lead, supplying

CORRECT ACCESSORIES
for receiving and
POWER TUBES



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General Radio 231A or 231M transformers,
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5000 SOLD LAST YEAR
AT \$1.00

Now reduced to

75c

Due to the general drop in the prices of raw material and to our large production, we have been able to reduce all our prices to their pre-war level, and in some cases even lower. New catalog No. 3, listing our complete line sent free. Here are a few of the items:

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| No. | Postpaid |
| 31. Audion panel with rheostat or B Battery Switch..... | \$8.00 |
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| 52. PARKIN .001 mf. V.C. with knob and 3 in. dial..... | 2.50 |
| 53. PARKIN molded bakelite fixed condenser | 0.70 |
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San Rafael, Cal.

BRASS SWITCH CONTACT POINTS

Size, 7/32x7/32

Price with 1/4-inch screw\$0.20 doz.

Price with shank and brass nut .30 doz.

Price of extra nuts for same... .10 doz.

Add Postage

Order from Ad Satisfaction Guaranteed

Immediate Delivery—Try us

STRATTON ELECTRIC COMPANY

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In writing to advertisers, please mention this Journal.

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Detector—Just audible signals.

One Stage—Loud Signals.

Two Stage—All over the house.

We are not selling a cat in a bag. It is here for you to listen in on, to tune yourself, to experiment with, right on our counter. Come in and satisfy yourself before you purchase your next set. Our arrangement for short waves is ideal and we do not hesitate to say that on short waves this set is as sensitive as on long waves. Come in and do your own experimenting.

It costs a little more, but you get more.

PEN BRAND Tuner.....\$75.00

PEN BRAND Detector, two step.....\$75.00

HORNS—HORNS—HORNS

We have purchased a number of **PAPIER-MACHE** phonograph horns from a company now out of business. These horns are in jet black, highly polished, finished with some gold drawings in mouth, making the horn very attractive. These horns give a clear solid sound, (they being paper) and throw signals a great distance. 2½ feet in length, open end 19 inches. Small end has brass tube inserted and is ¾ inches in diameter. Price with Baldwin phone attached \$20.00. Horn only \$5.00.



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The Tubes that are Different

UV 200 Detector\$5.00

UV 201 Amplifier 6.50

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Send your order to your nearest dealer.

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Dealers write for proposition.

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THIRTY-two pages of radio, all Radisco apparatus,—instruments for every part of your station,—codes, abbreviations, etc. All for ten cents. Send us your name and your dime by next mail, will send the 1921 catalogue just as quick.

NEW RADISCO COUPLER—

The vario-coupler that's "accurate to the .002 part of an inch." Moulded base, Formica tube. Brass for all metal parts.

Price \$7.50, postpaid

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Anyone can easily make smooth-running mountings with these plugs. Exceedingly accurate. Made to fit Radisco and all hand wound coils.

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VT Amplifier, (1 lb.) 7.00

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A. R. Co. .001.....\$6.25

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With No. 67 Dial add \$1.00

Murdock 366\$4.75

Murdock 367 4.75

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Complete with dial

Shipping weight One Pound.

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TUSKA C. W. APPARATUS

181 Coil, 2 lbs.\$ 7.50

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170 Filtr., 3 lbs. 16.00

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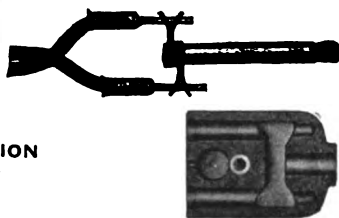
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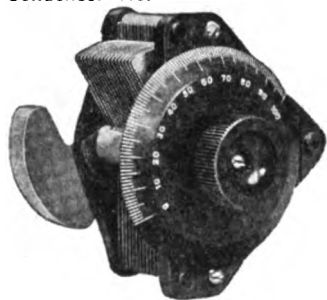
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Especially designed for C. W.
Will carry one Ampere at 1000 Volts
Ruggedly Constructed
Has constant capacity
Approved by our Government
Easily mounted anywhere
Of Universal Radio use
discounts.

CHELSEA Variable Condensers

Condenser No. 3

(Die-Cast Type)



No.	Capacity	Type	Size	Weight	Lbs. Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/4 x 3 1/4	1 1/4	\$5.00
2	.0006 m. f.	Mounted	4 1/4 x 4 1/4 x 2 1/4	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/4	1 1/4	4.25
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Top, bottom and knob are genuine bakelite,
shaft of steel running in bronze bearings, ad-
justable tension on movable plates, large baka-
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amply separated and accurately spaced plates.
Unmounted types will fit any panel and are
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Purchase from your dealer; if he does not
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Bulletin upon request.

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Manufacturers of Radio Apparatus and Moulders of Bakelite

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The new "Puget" transformer is now ready. Don't be misled by
ads for low voltage transformers. The "Puget" is resonant and puts
the most energy into your condenser. The 1/2 K.W. far outclasses
1 K.W.'s of other makes.

500 Watt Size.....\$26.75

25,000 volts

GIVES A CLEAR NOTE ON AMRAD GAPS

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1 Step Panel, \$18.00; 1 Step in Cabinet, \$22.00; 2-step in cabinet,
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Fast Mail Order Service

Northwest Radio Service Co.

609 FOURTH AVENUE

SEATTLE, WASH.

Statement of the Ownership, Management,
Circulation, Etc., Required by the Act of
Congress of August 24, 1912,
Of Pacific Radio News, published monthly
at San Francisco, Cal., for April 1921.
State of California, County of San Fran-
cisco—ss.

Before me, a Notary Public, in and for
the state and county aforesaid, personally
appeared H. W. Dickow, who, having been
duly sworn according to law, deposes and
says that he is the owner of the Pacific
Radio News, and that the following is, to
the best of his knowledge and belief, a true
statement of the ownership, management
(and if a daily paper, the circulation), etc.,
of the aforesaid publication for the date
shown in the above caption, required by the
Act of August 24, 1912, embodied in section
443, Postal Laws and Regulations, printed
on the reverse of this form, to-wit:

1. That the names and addresses of the
publisher, editor, managing editor, and busi-
ness managers are:

Publisher, Pacific Radio Publishing Co., 50
Main St., San Francisco.
Editor, Paul R. Fenner, 50 Main St., San
Francisco.

Managing Editor, none.
Business Manager, H. W. Dickow, 50
Main St., San Francisco.

2. That the owners are: (Give names and
addresses of individual owners, or, if a cor-
poration, give its name and the names and
addresses of stockholders owning or holding
1 per cent or more of the total amount of
stock.)

H. W. Dickow, 50 Main St., San Fran-
cisco.

3. That the known bondholders, mort-
gagees, and other security holders owning
or holding 1 per cent or more of total
amount of bonds, mortgages, or other se-
curities are: (If there are none, so state.)

Paul R. Fenner, 50 Main St., San Fran-
cisco.

4. That the two paragraphs next above,
giving the names of the owners, stockhold-
ers, and security holders, if any, contain
not only the list of stockholders and security
holders as they appear upon the books of
the company, but also, in cases where the
stockholder or security holder appears upon
the books of the company as trustee or in
any other fiduciary relation, the name of
the person or corporation for whom such
trustee is acting, is given; also that the
said two paragraphs contain statements em-
bracing affiant's full knowledge and belief
as to the circumstances and conditions
under which stockholders and security hold-
ers who do not appear upon the books of
the company as trustees, hold stock and
securities in a capacity other than that of
a bona fide owner; and this affiant has no
reason to believe that any other person, as-
sociation, or corporation has any interest
direct or indirect in the said stock, bonds,
or other securities than as so stated by
him.

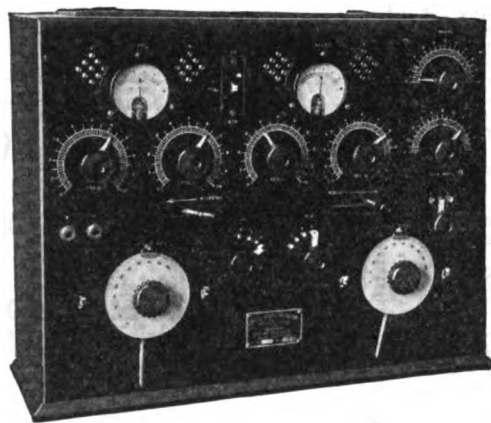
H. W. DICKOW, Owner.
Sworn to and subscribed before me this
28th day of March, 1921.

(SEAL) MARGUERITE S. BRUNER,
Notary Public in and for the City and
County of San Francisco, State of Cali-
fornia.

(My commission expires January 8, 1922.)

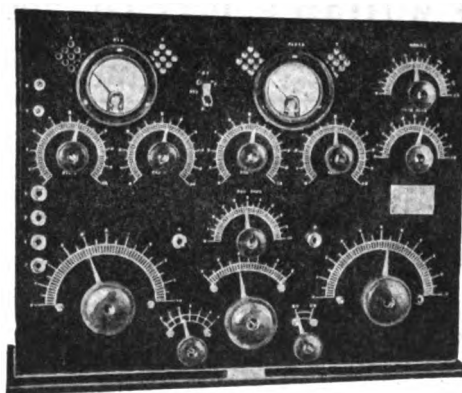
ARE YOU IN THE CLASS

of discriminating purchasers who keep quality foremost in their selections? If so, the two new receivers shown below are of interest to you



The Altaceiver, type CW-3 comprises a long wave damped or undamped wave receptor combined with a detector and three step audio-frequency amplifier. Inside tube mounting, potentiometer plate battery control, separate filament battery control, detector plate and filament circuit meters, vernier tuning adjustment and undistorted amplification are among its many special features. Used by the Chicago Tribune in copying foreign press despatches.

The Multiceiver, type MC-3 combines a short-wave regenerative receiver of the tuned tertiary type and of extreme efficiency, with a detector and three-step audio-frequency amplifier. Delicate plate and filament potential control, detector plate and filament meters, inside tube mounting, special battery-control, transmitting-receiving switch, antenna series condenser, and special amplifying transformers are provided. Provision made for addition of external loaders or use of external tuner and detector by means of simple plug and jack.



Our new Catalog F-21 describes these sets in detail. Write for it!

All our prices have been reduced! F-21 quotes new prices

CHICAGO RADIO LABORATORY

(New Address) 6433 RAVENSWOOD AVE.

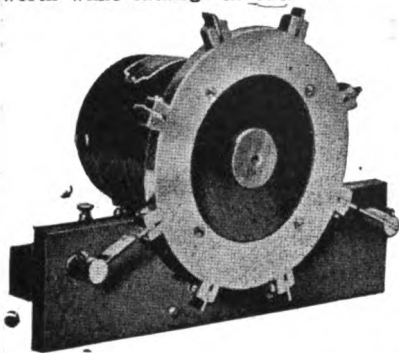
Testing Station: 9ZN, 5525 SHERIDAN ROAD

CHICAGO, ILL.



DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1788—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

THE WILLIAM B. DUCK CO., 210-212 Superior St., Toledo, Ohio

A Word To the Wise!

The "STANDARD VT BATTERY" is made by people who specialize. They concentrate their facilities upon the manufacture of plate circuit batteries. They know how and why plate circuit batteries are used, and what is expected of them in the way of service—for which purposes an assembly of common flashlight batteries will not serve efficiently.

Dealers who sell any of the three types of the "STANDARD VT BATTERY" guarantee them fully. They know of their excellent qualities, and offer you the benefit of their knowledge and selection when they sell you the "STANDARD VT BATTERY." Still, they're not expensive. This, combined with A-1 quality, is the secret of their extensive use.

Treat yourself to a full round of satisfaction by purchasing the "STANDARD VT BATTERY" from your nearest dealer.

RICHTER-SCHOTTLE CO., MFRS.
293 CHURCH STREET NEW YORK, N. Y.
PACENT ELECTRIC CO., Sole Eastern Agents, 150 Nassau St., New York City



LOOK!!

A Yearly Subscription to QST and Pacific Radio News for \$3.25
You Save 75c.

Pacific Radio Pub. Co. - 50 Main St.
San Francisco, Cal.

"B" Batteries AN EVEREADY PRODUCT

43V. Batteries, tapped.....\$5.00

22½V. Batteries, Navy Type.... 3.50

22½V. Batteries, Commercial Type 2.00

Latter two types especially adapted to Cunningham and Radiotron Tubes. Postage Prepaid Anywhere in U. S.

Ets-Hokin & Galvan

Wireless Engineers
10 Mission Street San Francisco

ALTADENA RADIO LABORATORY

ALTADENA, CALIFORNIA
Radio 6ABA

THAT MEANS HIGH GRADE RADIO APPARATUS

PARTICULARLY

CHICAGO RADIO LABORATORY THE BENWOOD COMPANY

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AM. RADIO AND RESEARCH CORP.

BALDWIN MICA DIAPHRAM FONES

BROWNIE ADJUSTABLE FONES

CUNNINGHAM VACUUM TUBES

MOORHEAD VACUUM TUBES

DOOLITTLE DECEMETERS

STANDARD B BATTERIES

ELECTROSE INSULATORS

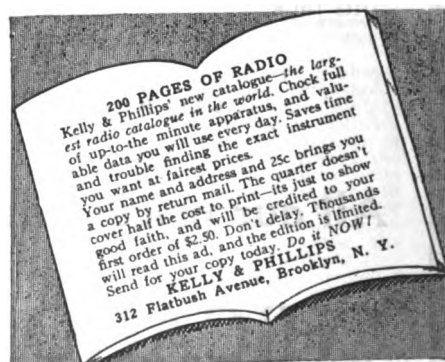
ACME TRANSFORMERS

ELDRIDGE METERS

COPPER BRAID

WIRE OF ALL KINDS

PAUL F. JOHNSON



5c

brings you by return mail the ABC catalogue. It describes the wonderful ABC Unit series, as well as a complete line of "Professional radio apparatus at amateur prices."

Send your name and nickel today.

WIRELESS EQUIPMENT CO. Inc.
32 AUSTIN ST. NEWARK, N. J.

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

RADIO PHONISTS, ATTENTION—HIGH VOLTAGE GENERATORS. We supply motor generator units in various capacities, especially designed for radio phone work. Low powered rotary converters, dynamotors, fractional H. P. motors, storage batteries. Various types of meters, condensers, navy type "4" nickel plate brass engraved dial, spark gap rotors, **SYNCHRONOUS SPARK GAPS.** **RAY-DI-CO RADIO PHONE** sets furnished knocked down ready for assembling and your connection. Get acquainted with our **SERVICE.** **RAY-DI-CO, 2653C N. Clark St., Chicago, Ill.**

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. **Pacific Radio Exchange, 439 Call Bldg., San Francisco, Calif.**

THE BEST HONEYCOMB COILS AT THE LOWEST PRICE. Many satisfied customers are using them. Immediate delivery on the following sizes: 25 turns, 45c; 35 turns, 45c; 50 turns, 55c; 75 turns, 60c; 100 turns, 65c; 150 turns, 70c; 200 turns, 75c; 250 turns, 80c; 300 turns, 85c; 400 turns, 90c. Postage extra. **Superior Coil Co., 183 1/2 Balboa St., San Francisco, Cal.**

FOR SALE—DeForest A. C. Radiophone, with 25-mile range, multiwave tuner, utility receiver, vernier condensers and other DeForest instruments at extremely low prices. All instruments **NEW.** Write to 5118 Harold Way, Hollywood, Cal., or phone Hollywood 3583 for further information.

FOR SALE—Detector and 3-step amplifier, complete, including honeycomb coil, Tungar rectifier, Exide storage battery, and six audions. Cost \$200 to make. Sell for \$150. **H. R. LEE, 3328 Sacramento St., San Francisco.**

FOR SALE—Beginners' telegraph instruments, 20 ohms, \$3 apiece; also 500 ohms Mineral detector for \$2. Good as new. **E. SHAFER, 1316 Ohio St., Quincy, Ill.**

VARIOCOUPERS, wound on bakelite forms, \$5.25; Variometers, inside windings, \$4.25; Microphone, transmitters, \$3; Regenerative units; Oak cabinets with and without bakelite panels. **Meade Bakelite Radio Apparatus, 975 Putnam Ave., Brooklyn, N. Y.**

FOR SALE—Baldwin Type E mica-diaphragm 'phones, new, in perfect condition, \$15. Savage .22 calibre hi-power rifle in perfect working and shooting condition, bluing slightly worn, \$35. Above absolutely guaranteed. **H. B. HARGUS, 119 S. Fourth St., Klamath Falls, Ore.**

ALEXANDER HAMILTON INSTITUTE COURSE FOR SALE, 1919 edition. All books in absolutely new condition, but one having ever been removed from its original wrapper; complete edition cost \$120; sell for \$65 cash, or express C. O. D. **D. B. McGOWN, 1247 47th Ave., San Francisco.**

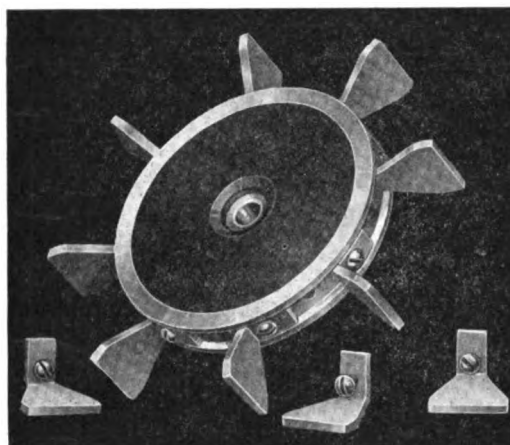
FOR SALE—Two short wave regenerative sets, without cabinets, \$25 each; 800 meter loose coupler, \$5; large lightning switch, fine marble base, \$5; E. I. Co. vario set, \$5; storage battery, \$8. **RALPH HAYNES, 615 Woodlawn Ave., Canon City, Colo.**

RADIO ENTHUSIASTS, ATTENTION!!! Our proven VT hookups, each on a separate blue print, are making a hit. No station complete without these handy, easily understood diagrams. Twelve receiving or twelve phone circuits in heavy cover, 50c. No stamps. Special to introduce our service. We are headquarters for radio plans. **THE PLAN BUREAU, 1929 McCausland Ave., St. Louis, Mo.**

HAVE A NEGATIVE OF YOUR FAVORITE HOOKUP!!! We will draw it on tracing cloth and you can make all blue prints wanted. 50c each or three for \$1.25. No stamps. **THE PLAN BUREAU, 1929 McCausland Ave., St. Louis, Mo.**

UNMOUNTED LONG DISTANCE RECEIVING INDUCTANCES. These are duo lateral wound coils, each tapped at five points. Two coils with a tickler make an unbeatable receiving combination. Range 2500 to 25,000 meters, Arlington to Lafayette. Prices, Primary and Secondary Coils, \$3.50 each. Tickler Coil, \$2.00. Send \$9.00 for the three coils and diagram, and make a guaranteed receiving set. **P. J. STOCKWELL, Reading, Mass.**

Bust Thru the QRM With a Benwood Removable Point Disc



ANY
NOTE

ANY
FRE-
QUENCY

Double Your Radiation

Sparking points are variable from 2 to 16.

Teeth are **Renewable** as well as **Removable**.

Disc is **Six Inches** in diameter and sparking points are **One Inch** in width. Complete disc weighs less than half pound; absolutely accurate and finely balanced.

This disc enables the operator to vary the frequency of the spark at will, regardless of the speed of the motor used. It enables the operator to obtain the maximum radiation from any spark transmitter by being able to change the spark discharge frequency to conform to **Any Condenser Capacity** and **Any Wave Length** that is in use at the present time. This disc will absolutely increase the transmitting range of **Any** spark transmitter because it is at once applicable to any make transformer on the market regardless of the voltage. It is the ultimate in rotary disc design and fills the long-felt need of every radio man.

A Clear note can now be had at all times. As soon as the sparking points on this disc become worn and uneven a complete new set can at once be put into service thus assuring the operator of maximum results at all times.

The center of the disc is **Moulded Bakelite**, the best insulation obtainable. Disc is fitted with carefully machined brass bushing and set screws for fastening to the motor shaft. It is also furnished with shaft for use with any of the enclosed **Benwood** gaps that are now in use.

Price complete with 16 sparking points, \$10.00

Specify size of motor shaft when ordering.

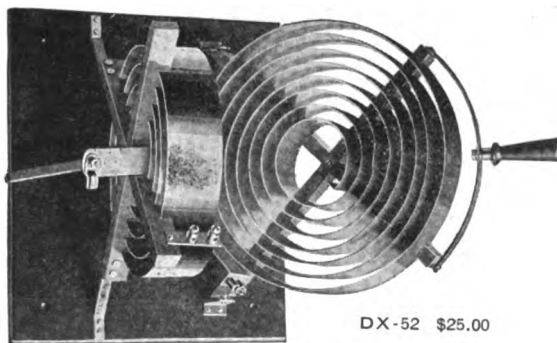
Extra sparking points 20 cents each or \$2.50 per set of 16.

The Benwood Company, Inc.

1300 OLIVE STREET

ST. LOUIS, MO.

Sold by **WESTERN RADIO ELECTRIC COMPANY** Los Angeles, Cal.



DX-52 \$25.00

The Oscillation Transformer that made possible 8ZR's transcontinental transmission to 6RJ, 6AK and 7ZJ.

Three-inch heavy ribbon Bakelite insulation, rugged construction. Write for a circular describing DX apparatus—the power apparatus. Dealers Wanted—Liberal contracts.

THE AMERICAN RADIO SALES & SERVICE CO.

Great American Bldg.
Mansfield, Ohio

Testing Station 8ZR.

DODGE SHORT CUT made it possible to memorize and master Continental code in one hour. Thousands have. Is simple. Anybody can. Method costs 50 cents. Save \$50. **C. K. DODGE, Box 220, Mamaroneck, N. Y.**

FOR SALE—One K. W. transformer, \$23. Marconi jar condenser, \$3. **C. I. MAYO, 2328 Channing Way, Berkeley, Cal.**

PRINT your PICTURES on PHOTO SILK. Package only \$1.35. **F. Irsa, Elizabeth, N. J.**

RADEQ AUDION CONTROL PANELS

The best control panel for the money; has polished formica panel mounted on oak base and equipped with tube socket, grid leak, condenser, rheostat, and nickel-plated binding posts. Price without B batteries or tube, \$10.00.

Wireless apparatus made to order; sets designed to use material you now have on hand. Send for price list.

A. C. PENFIELD, Conneautville, Pa.



It Isn't Necessary—

for you to live in San Francisco to enjoy the benefits of Kennedy Service. If there isn't a Kennedy dealer in your city, you can deal directly with us. Your needs will be filled promptly and satisfactorily.

We carry a full line of radio parts, accessories and supplies of other makes as well as our own. Here are a few suggestions:

Vacuum Tubes	
Cunningham Detector, C-300.....	\$5.00
Cunningham Amplifier, C-301.....	6.50
Cunningham 5-watt Transmitter, C-302.....	8.00
Moorhead E-R Detector.....	6.00
Moorhead V-T Amplifier.....	7.00
Moorhead T-T Transmitter.....	7.50
Vacuum Tube Sockets	
Murdock No. 55.....	\$1.00
Remler No. 92, one piece moulded bakelite.....	1.50
General Radio No. 156.....	1.75
Vacuum Tube Filament Rheostats	
R-49 Porcelain base for table mounting.....	1.00
Remler No. 810 for panel mounting.....	1.00
Remler No. 811, large size for panel mounting.....	1.75
Remler No. 813, for 3 tubes.....	1.75
Paragon No. 25.....	1.75
General Radio No. 241-A.....	2.50
Vacuum Tube Plate Batteries	
Eveready No. 766, 22½ volts.....	\$3.50
Eveready No. 776, 43 V., 7 Terminals.....	5.00
Vacuum Tube Control Units	
Paragon No. 70.....	\$6.00
Remler No. 330.....	8.00

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Murdock No. 55, 2000 Ohms.....	\$4.50
Murdock No. 55, 3000 Ohms.....	5.50
Brandes "Superior".....	8.00
Brandes "Transatlantic".....	12.00
Brandes "Navy".....	14.00
Brownlie Adjustable.....	12.50
Baldwin Type "C".....	16.50
Baldwin Type "E".....	20.00
Baldwin Type "T".....	21.00

Telephone Plugs and Jacks	
Federal open-circuit jack No. 1421.....	\$.70
Federal closed-circuit jack No. 1422.....	.85
Federal two-circuit jack No. 1423.....	1.00
Federal brass plug for above jacks, No. 1428.....	2.00
Federal No. 1428 plug, silver plated.....	2.50

Buzzers	
Century.....	\$2.50
Mesco No. 55.....	2.50

Honeycomb Coil Mounting	
Q. S. A. No. 400.—3-coil mounting with base, vertical standards, bakelite panel, stationary plug, two swivel plugs with levers for adjustable coupling. For standard mounted lattice-wound coils.....	\$6.50

Our price list and catalog containing many more items will be sent you on request.

THE COLIN B. KENNEDY COMPANY

INCORPORATED

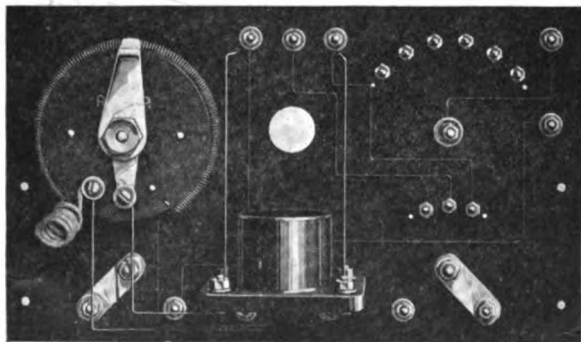
RIALTO BUILDING

SAN FRANCISCO

Special price reductions

Audion Control Panels with VT mounting, as illustrated.....	\$11.00
Same as above, but without the VT mounting, price.....	9.00

CESCO Variometers, each at.....	\$ 5.50
CESCO Variocouplers, each at.....	4.50
Bakelite Base Crystal Detectors, very special at.....	1.25



REAR VIEW OF AUDION CONTROL PANEL

This is the greatest panel value ever offered. It will not discolor like hard rubber, nor is it brittle or easily damaged. The panel is cut from solid sheet, not moulded. Surface highly polished. Lettering and scales machine cut, not stamped, and whitened. Metal parts heavily nicked. Filament rheostat back mounted. Wound for 5 ohms, it permits close adjustment of filament temperature. See prices above.

These prices are special, very special, and temporary only. The apparatus is standard, ace high in quality, and the saving to you considerable, in fact far greater than you may reasonably expect to secure again for some time to come, if ever. Mail your orders at once—

CALIFORNIA ELECTRIC SUPPLY CO.—643 MISSION ST., SAN FRANCISCO, CALIF.

Radio supplies that R right

When writing to Advertisers please mention this Magazine

CONTINENTAL NEWS

JUNE, 1921

Published Every Month In Pacific Radio News By Continental Radio and Electric Corporation

New York Radio Service by Mail

New York City is the center of radio development. A majority of the big manufacturers are located in or near New York. The latest ideas, the most advanced apparatus usually appears in New York first.

The Continental Store (in the Heart of Downtown New York) is in the best position to secure advance news and apparatus. The Continental Mail Order Service puts all these advantages, plus the most complete stock in the world's biggest city, as near to you as the quickest mail express. No matter where you live, Continental can—and will—fill all your radio needs with

Courtesy: Speed: Accuracy

To avoid delay, please make all remittances by bank draft or P. O. Money Order.

Do you spend over \$50.00 a year for Radio?

THEN YOU can afford a Paragon R. A. Ten Receiver. Although the original price is Eighty-Five Dollars, the iron-clad guarantee protects you from any up-keep expense for two full years!

Combine your radio investment for the next two years now, and invest in a Paragon. In no other way can you get such genuine pleasure, such remarkable results from any equal amount of money. For, every cent you pay for a Paragon represents high quality materials and workmanship. The unequalled design—the secret of Paragon's marvelous selectivity and amplification—doesn't add a cent to the cost over what you would pay for inferior engineering principles.

In last month's advertisement we printed unsolicited letters from three operators (including a Y. M. C. A. radio school), all of whom had made actual tests and comparisons. In each case, the Paragon "fulfilled every advertised superiority." One man said, "Nothing like it ever heard before, especially for strength of signals on detector alone."

Certainly, it pays to buy the best. Order your Paragon R. A. Ten, or send for FREE descriptive booklet today!

C. W.

In the words of Dr. Alfred N. Goldsmith, at the Second District Radio Convention, "Here's to the amateur, continuously may he wave!"

If there is anything you want for C. W. work not listed here, write us for information. We have it, or can get it for you quickly.

C. W. INDUCTANCES

No. 181 Tuska C.W. Inductance	\$7.50
No. 181 Tuska C.W. Inductance, unassembled	5.00
No. 182 Tuska C.W. Inductance	10.00
No. 182 Tuska C.W. Inductance, unassembled	7.50
No. 183 Tuska C.W. Inductance	12.50
No. 183 Tuska C.W. Inductance, unassembled	10.00

CHOKE COILS

Acme 1½ Henry, 500, M. A. Single Coil	\$6.00
Acme 1½ Henry, 500, M. A. Double Coil	8.00
Acme 1½ Henry, 150, M. A. Single Coil	4.00
Acme 1½ Henry, 150, M. A. Double Coil	6.00
C. E. Co., ZRX 8 Henry, 150, M. A. Single Coil	3.75

TELEPHONE TRANSMITTERS

Sterling Microphone	\$2.50
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RESISTANCES (Ward Leonard)

Ward Leonard Resistance, 5000 ohm	\$1.70
Ward Leonard Resistance, 10,000 ohm	2.95
Ward Leonard Resistance, 1500 ohm	1.50
Ward Leonard Resistance, 12,000 ohm	3.50
Lavite Resistance, 48,000 ohm, for Radio frequency amplifiers	3.00

MODULATION TRANSFORMERS

Acme A-3 unmounted	\$7.00
Acme A-3 semi-mounted	5.00
Acme A-3 unmounted	4.50
C. E. CO. ZRM MODULATION TRANSFORMER	4.50

GRID LEAKS

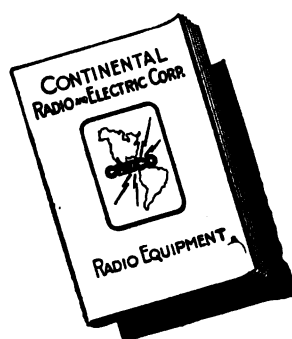
Marconi 1, 2, 3 or 5 megohms	\$1.25
Chelsea Variable ¼ to 5 megohms, 10 values	3.00
Chelsea Oscillator	3.00

METERS (Weston Model 301)

Model 301 0-3 amperes flush	\$8.50
Model 301 0-5 amperes flush	8.50
Model 301 0-50 volts flush	8.50
Model 301 0-100 Milli-amperes flush	8.50
Model 301 0-300 Milli-amperes flush	8.50
Model 301 0-500 Milli-amperes flush	8.50
Model 301 0-800 Milli-amperes flush	8.50

Do You Own a Quarter?

If you do,—and you're interested in radio,—the best thing you can do with it is to exchange it for the Creco catalogue.



25 cents,
stamps
or coin.

The Creco catalogue brings you 112 pages, full to the brim with descriptions, illustrations, prices, on radio apparatus for every need. It includes codes, abbreviations, tables for quick calculations, and other valuable material that you will use every day.

And, anyway, your quarter is refunded on your first \$5.00 order. Come on, be a sport, risk a quarter. You'll never regret it after you see the Creco catalogue. And you'll be mighty glad you saw this ad after you once experience Continental Mail Order Service.

Just your name and address and 25 cents. But do it now—the edition is limited.

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No. 127 Gen. Radio flush	
0-1 Amp.	\$7.75
No. 127 Gen. Radio flush	
0-3 Amp.	7.75
No. 127 Gen. Radio flush	
0-10 Amp.	7.75
No. 127 Gen. Radio flush	
0-5 Amp.	7.75

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214 Gen. Radio front or back mounted	\$2.50
Paragon Rheo. front or back mounted	1.75
Mesco Porcelain base	1.40

BUZZERS FOR BUZZER MODULATION

Century 168 Buzzer	\$2.50
Mesco No. 55 Buzzer	2.50
Mesco 251 Buzzer	.95

HIGH FREQUENCY CHOKE COILS

Electrodyn Rectifier consists of 500 V Transformer and 2 rectifying vacuum tubes all mounted ready for use.	
No. 25 R. T. Rectifier, less tubes	35.00
No. 25 V. T. Vacuum tube each	7.00

TRANSMITTING TUBES

Gen. Radio Drum Switch	6.50
------------------------	------

G. R. TRANSMITTING TUBE SOCKET

	1.75
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JEWELL METERS

Model 33 0-1 flush	\$6.00
0-3 flush	6.00
0-5 flush	6.00

0-50 Volts flush	6.00
0-500 Volts flush	15.00
0-50 Mil Amp	6.00
0-100 Mil Amp	8.00
0-300 Mil Amp	6.00
0-500 Mil Amp	6.00

JEWELL THERMO AM-METERS

0-1 Amp	\$15.00
0-3 Amp	15.00
0-5 Amp	15.00
0-10 Amp	15.00

TRANSFORMERS (For C.W. Work)

Acme 200 Watt, mounted	\$20.00
Acme 200 Watt, unmounted	16.00
Acme 50 Watt, mounted	15.00
Acme 50 Watt, unmounted	12.00

MOTOR GENERATORS

International 500 V 100 Watt AC Drive	\$99.00
International 500 V 100 Watt DC Drive	110.00
Electric Specialty Co. 350 V 50 Watt AC or DC	97.00

CONDENSERS

WE 21 A A I M F D tested at 1000 volts, each	\$2.50
Dublier .25 M F D Mica Condenser, tested at 1800 Volts	6.00
Dublier .0005 Grid Condenser for transmitting sets	1.00
High Voltage Variable Air Condenser, will stand 1000 V Capacity .001 M. F. D. Just the condenser for your Antenna circuit	29.00

VARIOMETERS

Radio Craft Variometers	\$6.00
Nightingale Variometers (small)	4.50
Nightingale Variometers (large)	5.50
Grebe Variometers	8.50
Clapp-Eastham Variometer with knob and dial	6.50
Clapp-Eastham Variometer less knob and dial	5.75

CONTINENTAL

RADIO AND ELECTRIC CORPORATION

J. DiBLASI, Sec.

J. STANTLEY, Treas.

Dept. G 74

6 Warren St.

New York

ACCURATE
as a high priced watch

One five hundredth of an inch (.002), a tiny fraction of a hair's breadth—that's the standard of measurement that makes the

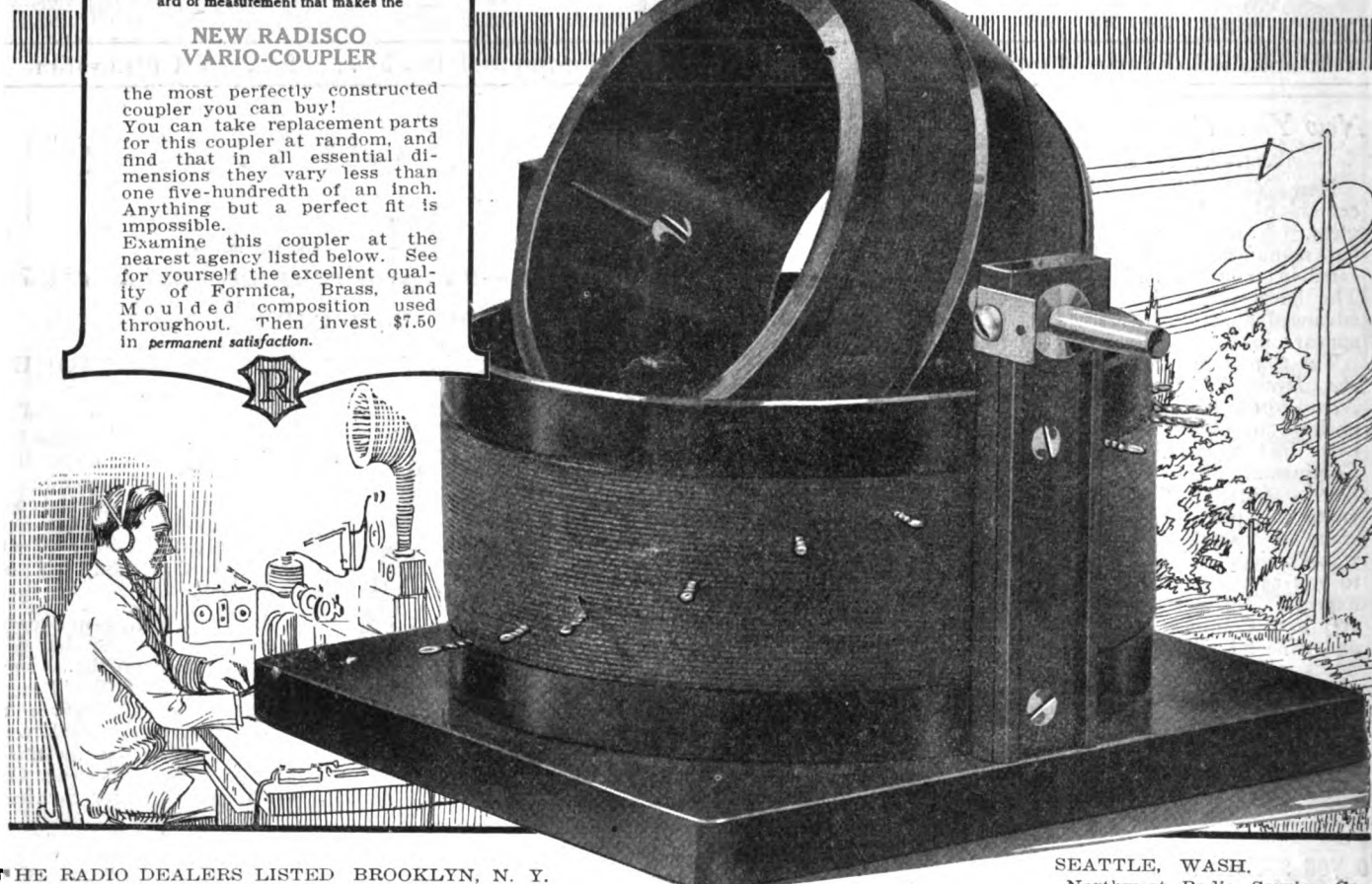
**NEW RADISCO
VARIO-COUPLER**

the most perfectly constructed coupler you can buy! You can take replacement parts for this coupler at random, and find that in all essential dimensions they vary less than one five-hundredth of an inch. Anything but a perfect fit is impossible. Examine this coupler at the nearest agency listed below. See for yourself the excellent quality of Formica, Brass, and Moulded composition used throughout. Then invest \$7.50 in permanent satisfaction.

This Mark



Your Guarantee



THE RADIO DEALERS LISTED
below are progressive merchants. They are equipped to give you helpful advice and real service in selecting your radio equipment. As an indication of their up-to-date methods, they carry a complete line of Radisco apparatus, including the coupler shown above, Radisco Collis, Better "B" Batteries, Corwin Dials, etc. Go to the nearest Radisco agency, and be sure of satisfaction.

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O-B Radio Supply Co.
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PROVIDENCE, R. I.
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WASHINGTON, D. C.
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Canadian Radio Mfg. Co.
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567 College St.

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If you are in a town, where there is no Radisco agency, you will benefit by writing for the Radisco plan.

RADIO DISTRIBUTING CO., NEWARK, N. J.

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"Your Assurance of Satisfactory Performance"

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

how to find out-

THE A-P VT AMPLIFIER- OSCILLATOR

—the amplifier used by the U. S. Navy. "Use the tube the Navy uses."

Price \$7.

THE A-P ELECTRON RELAY

—the most sensitive detector of spark signals known to the radio art.

Price \$6.

THE A-P TRANSMITTER TUBE

—an efficient undamped wave transmitter for use in radio-telephony.

Price \$7.50.

A-P Tubes are licensed by the Radio Corporation of America under the DeForest Audion and Fleming patents for amateur and experimental use in Radio communication.

Order from your dealer or write direct.

A-P Tubes have been imitated but never equalled. Those who use them *know*. Read this letter. Scarcely a day passes but what we receive, unsolicited, enthusiastic testimonials similar to the following:

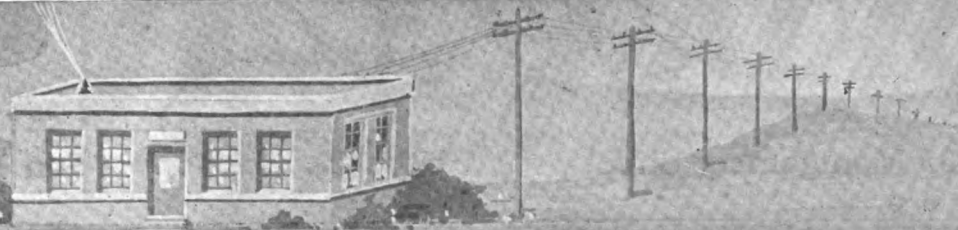
Gentlemen:—"We have recently received a shipment of E. R.'s and Amplifier oscillator tubes. It is our policy to test out all tubes received, under actual operating conditions. They were absolutely the finest bunch of tubes we ever received. It is indeed a pleasure to be able to sit down and with a clear conscience write a letter stating that we are at last receiving really good tubes for the amateur." THE PRECISION EQUIPMENT CO., 2437 Gilbert Ave., Cincinnati, Ohio, by H. F. Brickel, Vice-President, March 21, 1921.

And for the best book on Radio, ask your dealer for "Elements of Radiotelegraphy," by Lieut. Ellery W. Stone, U. S. N., or order direct from—

The Atlantic Radio Supplies Co., 8 Kirk Place, Newark, N. J.
The Pacific Radio Supplies Co., 638 Mission St., S. F., Cal.

Distributors for Moorhead Laboratories, Inc.

use A-P tubes for efficiency



Be waiting on 350 meters **JULY 2**

BULLETIN RADIO WILL "COVER" BIG FIGHT JULY 2

"Listen in," wireless fans! Get your "sets" tuned up for the big fight!

Round by round the story of the Dempsey-Carpentier ring battle will be relayed to you by radio just as soon as each new development comes into The Bulletin over its leased wires on the day of the fight—July 2.

All you have to do is "tune 'er up," and "listen in." Anywhere within 800 miles of San Francisco on land, or as far away as 2000 miles at sea, The Bulletin's flashes will reach you. Just clamp the head-set over your ears on the afternoon of the big day and wait for the news to come.

From the highest wireless sending station in San Francisco, that of the Leo J. Meyberg Company at the Fairmont Hotel, the leased wire messages will be radiated out over land and sea by The Bulletin.

Within the space of seconds after the final gong sounds you will know the decision if you are "listening in," at The Bulletin's "wireless party." This service is given to you without the expenditure of labor or money. It's as free as the air that carries the electric waves through space.

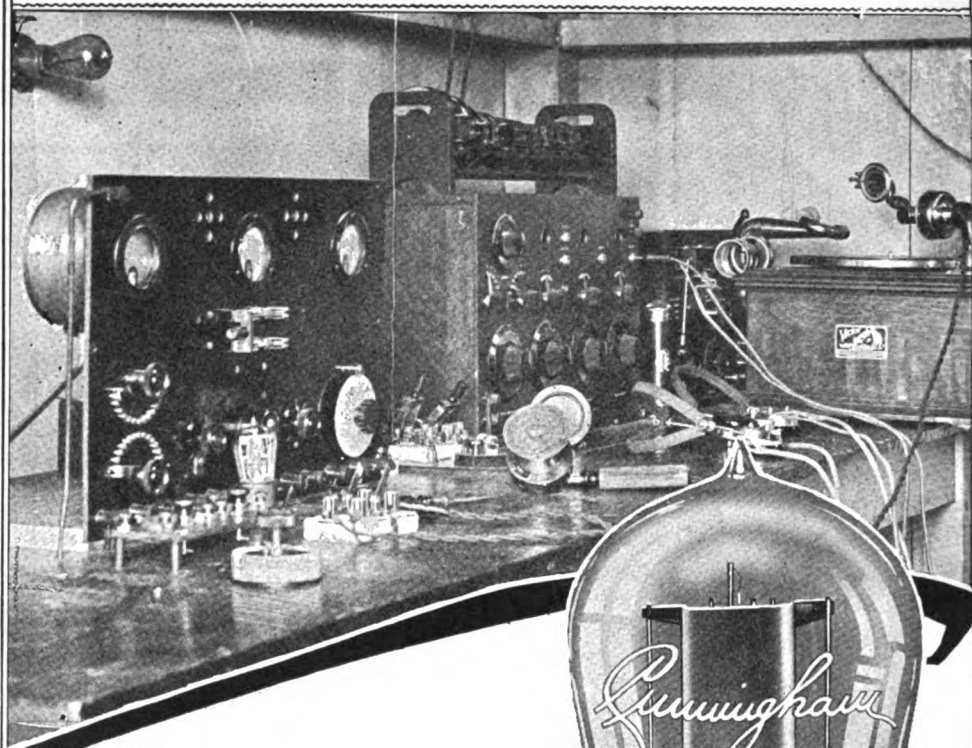
Don't wait until the last minute to get your instruments attuned to the wave length used by the Meyberg station! Get busy now and listen for the series of phonograph records being played daily and sent out from the Fairmont just to familiarize operators with the wave length.

The day of the big match isn't far off. Take advantage of service "direct from the ringside to your private 'set.'"

"Listen in!"

DEMPSEY JUST ENTERED THE RING!

That's the word that will be flashed by wireless telephone for The Bulletin the afternoon of July 2. And from that moment on there will not be a move or a blow struck in the ring at Jersey City that won't be described by The Bulletin's radio phone service. The photo shows the complete 5-watt radio phone installation installed at the Fairmont Hotel by the Leo J. Meyberg Company. This service may be heard for a radius of 800 miles inland and 2000 miles at sea. "Listen in" the afternoon of July 2.



ON July 2nd the Leo J. Meyberg Company, from their radio telephone station at the Hotel Fairmont, San Francisco, using the 5 watt Cunningham Power Tube C-302, will send out the complete returns of the Dempsey-Carpentier World Championship fight.

Cunningham Detector Tube C-300 and Remler 330 Detector Panel is the most efficient combination for listening in for this big news.

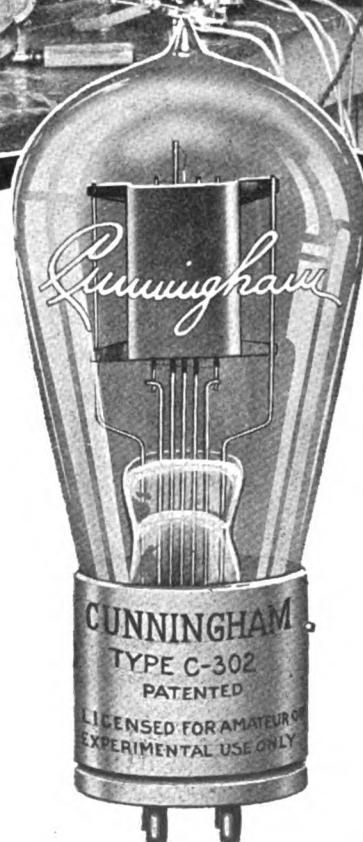
Connect up for this big event. Use Cunningham Tubes and Remler apparatus for clear reception.

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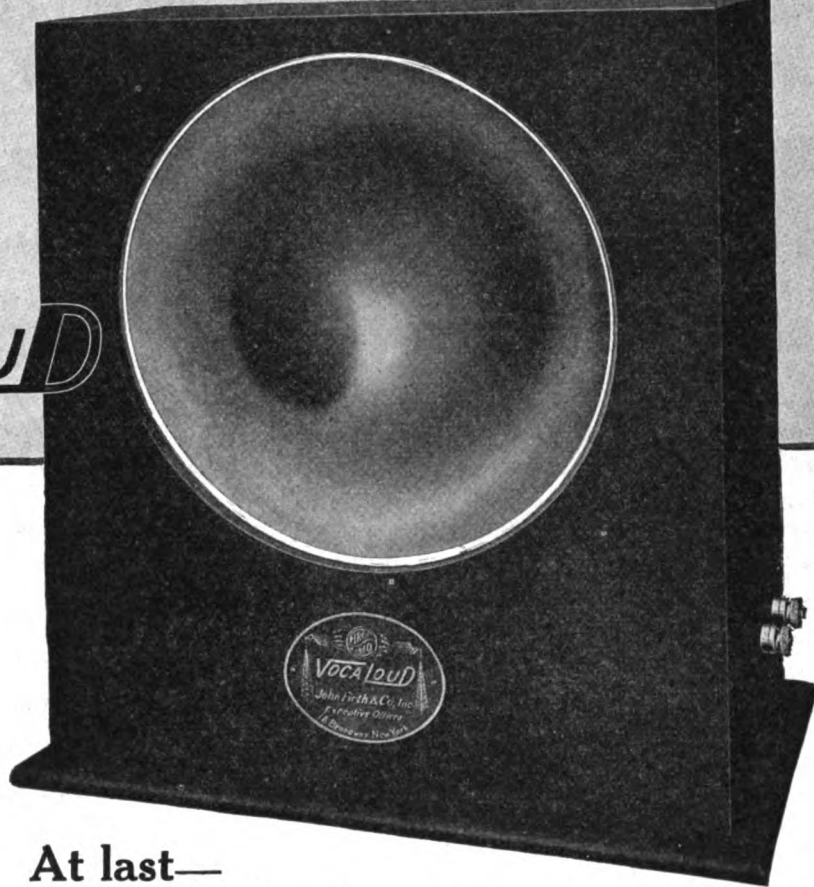
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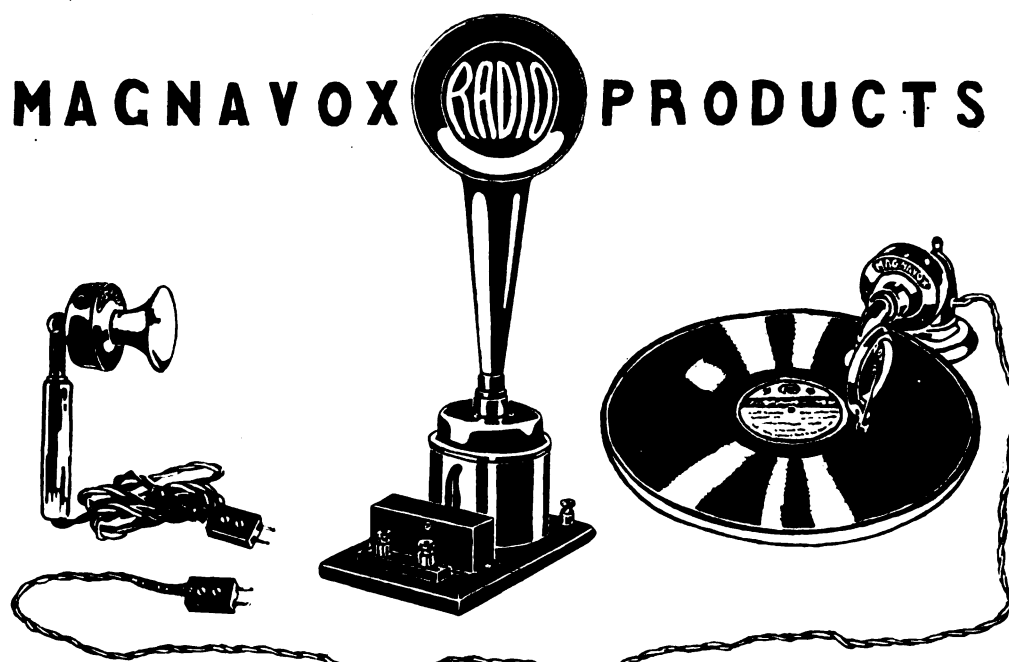
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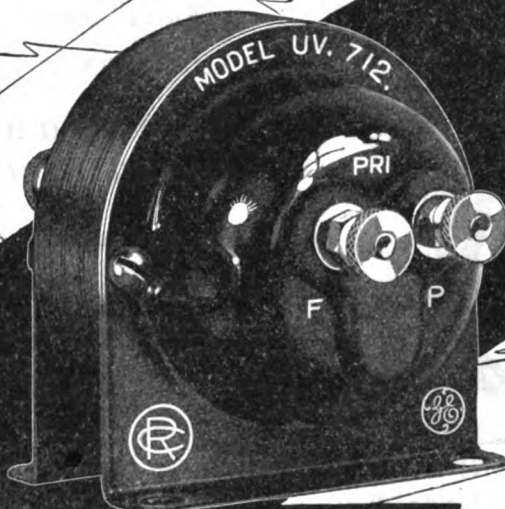
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Radiotrons by the engineering forces responsible for the development of Radiotrons. Tests prove conclusively its mechanical and electrical superiority. U.V. 712 provides unequalled amplification. Try it!

A descriptive bulletin on transformer U.V. 712 can be obtained from your Dealer or write direct to

The Radio Corporation's tubes are covered by patents dated November 7th, 1905, January 15th, 1907, and February 18th, 1908, as well as by other patents issued and pending. Tubes licensed for amateur and experimental use only. Any other use will constitute an infringement.

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CONTINENTAL NEWS

JULY, 1921

Published Every Month In Pacific Radio News By The Continental Radio and Electric Corporation

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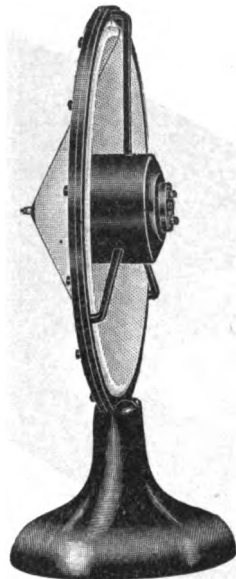
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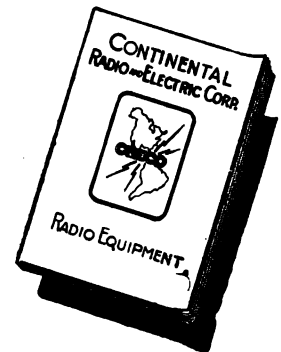
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DO YOU KNOW THE CODE?

THAT'S a funny question to ask radio men of experience," you think, "why, certainly I know the code."

But DO you know the code? You know that A is dot, dash, and B is dash, dot, dot, dot, and so on down the line, and you probably know those dots and dashes so well that you can, upon hearing them in proper combination, copy at a rate of from twenty to as high as thirty words a minute and make good legible copy. But still, DO YOU KNOW THE CODE? Let's see if you do.

In your sending, are your dots exactly half, or a quarter or a sixteenth as long as your dashes? If you can answer that question you must have a tape record of your sending, or some equally effective method of actually measuring your sending. But this brings out the point; do you really know whether your sending is RIGHT?

The other night we were listening to one of the relay operators out in Ohio endeavoring to get a MSG to a nearby state. It really was a shame. The man could receive, and receive well, he had a good transmitter, well adjusted; he could be heard by the other relay station, everything was fine; BUT, we couldn't copy his sending if we were within a mile radius of his station. Yes, you've guessed it, the man COULDN'T SEND. Of course the other relay operator was a gentleman, he didn't wish to hurt the Ohio man's feelings, so he came back, "QRM", and the MSG was QTAed. We didn't ever find out whether the MSG got through, because it wasted too much time waiting for that QTA to finish, and it surely was awful.

And there's the trouble with many of us. WE DON'T KNOW HOW TO SEND. Now so far it's been all criticism of destruction—next for the constructive work, how to remedy the trouble.

Those men who can't send well are not to be blamed nor condemned, their faults have been gathered through the years through lack of proper guidance and absence of intelligent instruction. But those of us who now have those bad



PAUL R. FENNER
EDITOR OF "PACIFIC RADIO NEWS"

habits must sacrifice one thin in order to get up with the ranks of perfect senders, who can be copied so easily. That thing is SPEED, we must cut out the speed, not down to fifteen or twenty words a minute, but way down to five or ten words a minute. That sounds hard, but disregard our warning and you will be condemned to poor sending the rest of your life. And the worst of it is you won't improve, you'll get worse as time goes on. All right then cut down the speed.

With reduced speed you can judge the length of the three important factors which go to make up perfect sending. These three factors are, dots of correct length, dashes of correct length, and space intervals of correct length. Or-

dinarily, instructors of code state that dots should be of half the length of dashes. This does not work out in practice, and the most readable sending is obtained in using dashes three times the length of the dots, and time spaces, between dots and dashes of the same letter, equal to the dot length. Considerable variation of the above is allowable and yet without sacrificing clearness and readability. The advantage of using the shorter dot, the one-third length dot as it may be called, is in increased speed of operating. This is because the space intervals between dots or dashes of the same letter, which are equal to dot length, or may even be a shade shorter, take less time to send a letter than if one-half length dot and equal space is used, and even greater accuracy is obtained.

But the greatest bane to sending, and the trouble most of us have that are poor senders, is in irregularity. That is, for example, in an H the first dot is shorter than the last three, or middle two, and the last short like the first. The dots in an H should be all of exactly equal length and the three spaces separating the four dots should be equal to each other in length also. Every dot in every letter should be of the same length, every space between dots and dashes should be of equal length, and letters should be regularly spaced. Practice it slowly and you can gradually find out your shortcomings and faults.

Often an operator has a poor sense of values (not through his own fault, or any discredit to him) and it is through this wrong sense of time intervals that his sending has developed poorly. In this case he should call to his aid an operator who actually sends very well and who can explain and understand his mistakes and who is able to tell him just what to do with the key to get the desired result.

Another fault is sending letters so close together that the letters mix up and the receiving operator might, in such a case make double dash out of BT, or PD out of AND, or 6E out of THE and

(Continued on page 430)

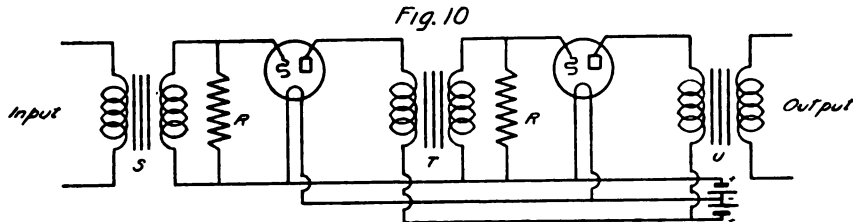
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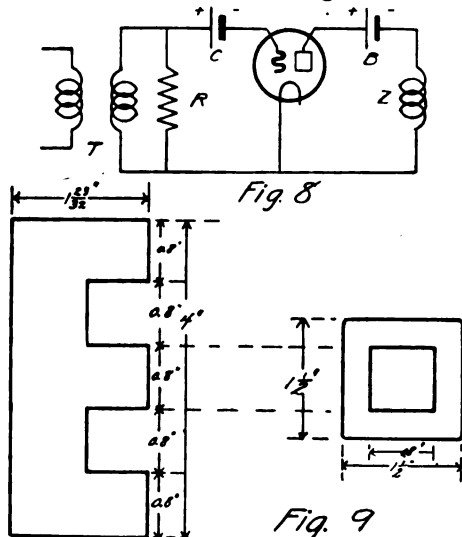
IN the second article of this series, voltage amplifiers were discussed in detail. In this article we shall consider power amplifiers. Let us consider a usual, a typical circuit Fig. 8. The coupling (z) may be a pure resistance, a reactance or a transformer, in any case a mathematical investigation shows that a tube will deliver its maximum amount of power when the load impedance is equal to the plate impedance of the tube. Hence no matter what is placed at z , a resistance, a choke coil, or a transformer primary, its impedance should be equal to that of the plate impedance of the tube.



The common type of coupling for power amplifiers is the transformer, some times of an air core but usually of an iron core type because the air core type has too much magnetic leakage and is too inefficient. For a given impedance an iron core has much less d.c. resistance than an air core one and low d.c. resistance is a decided advantage.

The air core transformer was advocated at one time because the hysteresis of iron at telephone or radio frequencies was considered too high for good results. But this has been shown not to be the case for the ordinary silicon steel transformer core work very well at telephone frequencies (900 cycles). For radio frequency a peculiar design of core is resorted to. Before designing a coupling transformer the band of frequencies over which the amplifier is to operate one has to be decided. Transformers can be designed with a very flat resonance curve but at best their operation is not entirely independent of the frequency. As has been previously stated the primary impedance of the transformer should be equal to the plate impedance of the tube and the secondary should be wound so as to produce the highest possible voltage on the grid.

For the design of a radio frequency transformer the following design is suggested. This transformer will give satisfactory results between 600 and about 6000 meters wave length, the peak of the resonance curve being at about



3000 meters. See Fig. 9 for dimensions of the core punchings and winding spool. The core is of the shell type having butt joints. The iron should not touch at these joints but should be separated about one-sixteenth inch with paper or fiber. This gap is absolutely necessary as a completely closed magnetic circuit would not function properly at the extremely high frequencies at which this

transformer is to be worked. The thickness of the core should be about nine sixteenths inches and should be made of the thinnest possible silicon steel. The clamp strip for the core must be non-metallic. The winding consists of a single layer of wire made up of three sections, two secondaries and a primary symmetrically spaced on a paper tube the end washers of which are shown in Fig. 9. It will be noted that the winding is held at quite a distance from the iron as the rectangular tube has an outside dimension of one and one-half inches. The secondaries each are wound with ninety turns of No. 40 S. S. C. wire and the primary of one hundred eight turns of the same wire. The secondaries are connected in series. The coils are arranged in the following order—secondary—primary—secondary. There should be about one-eighth inch space between each coil. These are the essential dimensions, the method of mounting the transformer, etc., is left to the builder.

For wave lengths below 600 meters the iron core coupling transformer is not recommended although some experimenters report excellent results with a transformer made according to the above given dimensions on wave lengths as low as 200 meters. For best results the tuned reactance coupled voltage amplifier is to be recommended for radio frequency work except when a special circuit to be discussed later is used.

For audio frequency work the transformer coupled power amplifier is very satisfactory for all work except for the very best reproduction of music as the band of frequencies over which music reaches is extremely large even for a transformer having an extremely flat resonance curve. I don't consider it necessary to give the dimensions of any audio frequency transformers here because one can buy very good transformers on the market today much cheaper than one can make them. On selecting a transformer the following points should be considered.

1. The primary impedance should be very nearly equal to that of the tube with which it is to be operated. The values of tube and transformer impedance can be obtained from the manufacturer.
2. The transformer should be of the closed core type with good magnetic joints, butt joints will not do, they should always be lap joints.

POWER AMPLIFIERS

By A. K. ASTER
Instructor, Department of Physics, University of California.

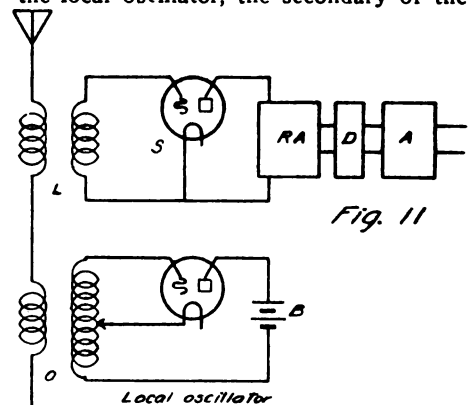
3. The voltage ratio must be as high as possible.

4. The core should be of good silicon steel, not store pipe iron and should be very thin. I have seen some that look more like armor plate than transformer laminations.

Figure 10 shows the usual connection used in practice for best results. When the transformers have very high ratios (above 1 to 3) the shunt resistance across the secondary is necessary for best results and should be about equal to the secondary impedance. It may be necessary to insert negative grid batteries, but depends entirely on the type of tube used. The amount of negative grid voltage, if any, for best operation of an amplifier tube can always be obtained from the manufacturer.

The above described amplifiers cover practically the entire field except the so-called "feed back" or "regenerative" type which will not be discussed here as they form a subject by themselves.

I stated previously that I would describe a device by which iron core transformers could be used for radio frequency work at 200 meters. The arrangement is as follows. Instead of amplifying the incoming signals at 200 meters, they are first converted to, say 3000 meters by heterodyning them at radio frequency by means of a local tube oscillator to 3000 meters. See Fig. 11 for connections. In this diagram (S) is the first step of a radio frequency amplifier, the remainder of the radio frequency amplifier being designated by the rectangle marked (RA). The rectangles (D) and (A) represent a detector and audio frequency amplifier respectively, the telephones not being shown. Once the signals have been converted to 300 meters there is no further trouble in amplifying them with iron core coupled radio frequency amplifiers. This arrangement has many advantages. (1) The increased amplification and sharpness of tuning due to the heterodyne effect is obtained, hence elimination of interference. (2) The iron core transformer amplifier work very steady and are free from noise due to bad contact on resistance rods, etc. (3) The iron core coupling transformers need no tuning, all tuning being concentrated in the primary of the loose coupler and the local oscillator, the secondary of the



loose coupler being left tuned to, say 300 meters.

The local oscillator should be preferred.
(Continued on page 428)

THE MAGNETIC AMPLIFIER

A Treatise on its Theory, Design, and Construction
By Jennings B. Dow

Published by Permission of the Secretary of the Navy.

PART II. DESIGN

The magnetic amplifier has made its debut into the radio field quite recently—its development has been confined to the efforts of a very few, and its commercial application has been somewhat limited. For these reasons, the following treatise on the design cannot be generalized, but must be considered in its application to a particular case. We shall, for the remainder of this article consider as our particular case, the design of a magnetic amplifier, or iron relay, as it may be more appropriately called here, for use with a 60 K. W. Federal Poulsen Arc. This case probably represents one of the most difficult ones that could be selected for the reasons that the arc is a most unstable generator of radio-frequency currents, the period of oscillation is seriously influenced by almost anything that can be placed in the circuit, and these characteristics follow no fast laws upon which computation may be based. The selection of this case results merely from the fact that it represents an actual one, thoroughly investigated in practice. This permits us to deal with facts.

Consider first the case of an arc converter (Fig. 5) connected to an antenna through suitable loading inductance, and the antenna circuit oscillating at a frequency of 30,000 cycles per second, which corresponds to a wave length of 10,000 meters.

Assume that the damping factor of the receiving circuit in use in the reception of signals from this station is such that a signal having a wave length 400 meters longer than the resonant wave will just render the incoming signal inaudible. In other words, changing the frequency of the emitted wave from 30,000 to 29,000 cycles per second would produce sufficient change in the strength of the received signal to ac-

complish the desired result. Neglecting the resistance of an oscillating circuit the frequency of oscillation is

$$n = \frac{1}{2\pi\sqrt{LC}}$$

or when the constant L and C are expressed in micro units

$$n = \frac{3 \cdot 10^8}{1885\sqrt{LC}}$$

The formulae do not ordinarily hold for computing the frequency in the case of an arc, but we may assume that their values are approximate and that the resistance of the arc does not change with the small change in frequency considered here.

$$10,000 = 1885\sqrt{LC}$$

$$10,400 = 1885\sqrt{LC}$$

L and L_1 may easily be found by solving each equation for C and equating, or by substituting the measured value of C in each equation, then solving for L and L_1 . The difference between these two values L and L_1 will give the change in inductance necessary to detune the resonant condition existing between transmitting and receiving station, to the desired extent.

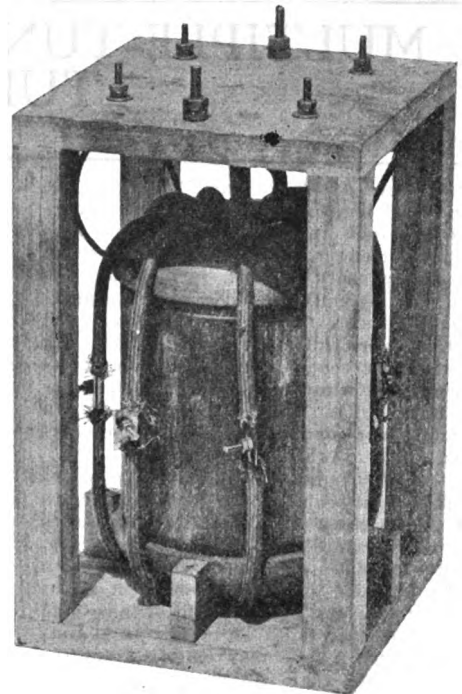
Assume $C = 0.002$ micro-farad

$$L = 14.10 \text{ millihenries}$$

$$L_1 = 15.25 \text{ millihenries}$$

$L_1 - L = 1.15$ millihenry required in the form of additional inductance.

From this, it is obvious that very little inductance will be required. The question may arise here—why limit our change of inductance to 1.15 millihenry? In this particular case, the answer is—owing to the instability of the arc as a generator of high frequency oscillating currents, any instantaneous change in the characteristic of the wave, which represents a change in the operating condition of the arc itself, is liable to extinguish it, or make it momentarily



Assembly, 60 K.W. Relay

unstable. For this reason, the change must be limited to the requirements of the problem.

As stated heretofore, we are designing a device to control the output of a 60 K. W. Poulsen Arc operating at a frequency of 30,000 cycles per second. With an antenna having a fairly low resistance, this will, under ordinary conditions, result in a radiation of approximately 80 amperes. The magnetizing effect of this current may be shown graphically by plotting current against time (Fig. 6).

The exciting or control current for this device may, of course, be made any desired value, and the control winding must be designed to give the desired magnetizing

(Continued on page 432)

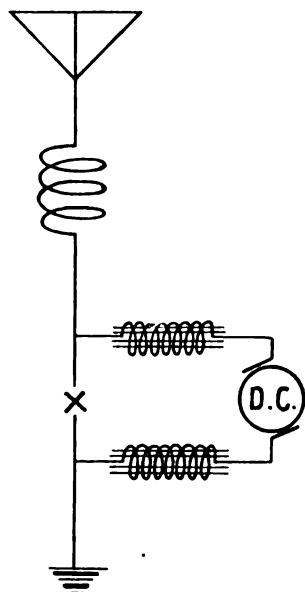


Fig.-5

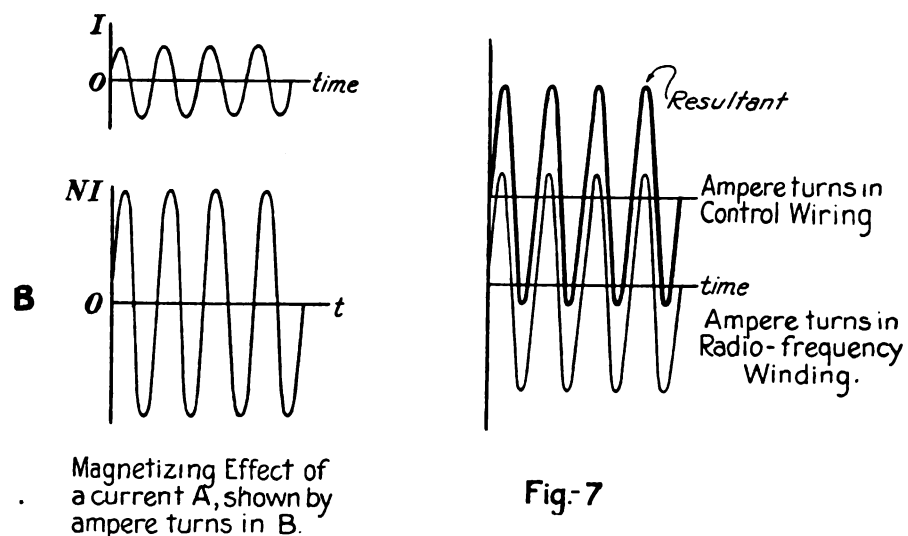


Fig-6

Fig-7

MULTIPLE-TUNED ANTENNAE FOR VACUUM TUBE TRANSMISSION

By H. TENNY

It is almost safe to say that, with the universal application of the Armstrong-vacuum-tube receiving circuit, and with the present standardization of both quenched and rotary spark circuits, further development of transmitting and receiving apparatus as regards fundamental electrical and mechanical principles will be negligible, or practically absent, as long as communication without wires is conducted along present lines, with the sole exception of the vacuum tube as a generator of oscillations.

Even the vacuum tube, as at present developed, has been so thoroughly analyzed and investigated that its characteristics can be calculated to a delightful nicety. Future revolutionary work in application of the vacuum tube will be brought about only through the development of new and entirely distinct types of tubes. It is conceivable that a tube may emerge from the distant future that will operate without a plate battery, using the dynamic energy of the electron discharge as a source of power. The imaginary possibilities are unlimited, but the present actual limitations of the vacuum tube have been acutely and definitely reached.

Perhaps the greatest drawback to the tube as a generator of high frequency current is that it operates solely as a variable resistance device, instead of a variable generator of electro-motive force. To this is due the fact that a tube, in a perfect theoretical circuit, must waste at least fifty per cent of the applied energy. In actual use a loss of eighty per cent is considered indicative of efficient operation!

A more keen appreciation of this fundamental weakness of the vacuum tube as a generator, or even as a detector, can be had by trying, in imagination, to picture our central power stations converting direct current to alternating by short-circuiting a giant resistance unit, in series with the line, one hundred and twenty times per second! This would, of course, produce only a pulsating current, but which could be subsequently converted to true A. C. by passing it through a static transformer. And that is exactly what we do in generating oscillations by the tube method. The more mathematically inclined among us can easily calculate that, in order to have the greatest effect on the line voltage, the energy consumed by the resistance so used must be exactly equal to that of the useful load. Efficiency: per cent 50.

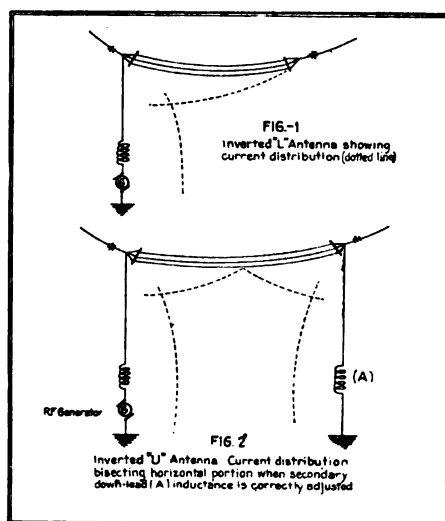
This feature of the vacuum tube is inherent in the three electrode type which represents the cream of our research work to date. It is due to the adaption of the tube to the modulating of an extraneous applied e. m. f., and will be overcome only when a tube is brought forth which will generate its own primary voltage, varying same at the frequency desired. All indications and conclusions of present research work hold little hope for such a development. Time alone will tell.

The principal advantage of the present day tube, however, is its action as a positive, self-timing generator of continuous oscillations of such freedom from harmonics, and such perfection of sine waveform, as to enable their adaption to the multiple-tuned antenna for radiation purposes.

The significance of this phase in the de-

velopment of amateur radio is as yet hardly realized, even among our leading spirits. This is probably due to the lack of general knowledge of the principal underlying the multi-tuned radiating system, due to its almost exclusive use of installations of the highest power, for transoceanic communication.

The multi-tuned antennae operates on a distinct and quite revolutionary set of electrical principles, which are all its own. Upon investigation, however, these strange newcomers are quickly identified as some of our oldest and most respected theories. Chief among these, and most important, is the established fact that a number or units



in parallel will behave quite contrary to the way that is to be expected when they are connected in series.

Coming back to fundamental principles, it is well known that the lifting of a quantity of electricity a certain distance and then lowering it to the starting point involves a certain amount of electrical work. And that this work varies directly to the quantity of electricity moved and the distance it is moved.

In addition to this, when electricity is so moved, the resultant electrical displacement, or disturbance, involves a small loss of energy due to the radiation into outward space of an electrical wave. The amount of energy so radiated is therefore dependent on both the amount of electricity moved and the distance through which it is moved. Good.

If the said electricity is moved through the same distance, or space, a given number of times per second, another factor is introduced into the proposition, which is that the energy so radiated is also proportionate to the number of times per second that the said movement takes place.

The capacity of the antenna determines the amount of electricity moved into it with a given pressure, and the height of the antenna determines the distance which the electricity is moved. It also determines, to a large extent, the inductance, or electrical inertia, of the antenna.

Owing to the necessity of working an antenna at or near its fundamental frequency, which is a product of the capacity and inductance, we soon find the orthodox type of antenna to be the possessor of several serious drawbacks. When we increase

its capacity to increase the amount of electricity we can pump in and out of it, and therefore increase the energy which we thereby cause to be radiated, we find that the said increase of capacity increases the length of time required for the said pumping, and by so lowering the frequency of successive chargings, decreases the effective radiation, and, for practical purposes of radiation, neutralizes the beneficial effects of the increased capacity.

In high powered stations for long distance work this loss of effective radiation is compensated by the better traveling ability of lower frequencies, or longer wavelengths. When we are restricted to a short wavelength of 200 meters, however, the problem taken on a different aspect altogether. To work long distances we must increase the amount of power used. To increase that we must increase the size of the antenna used for radiating it, and when we increase the size of the antenna we increase its fundamental wavelength and make it unusable to our requirements. The multiple-tuned principle, however, makes it possible to increase the size of the antenna without the undesired consequences.

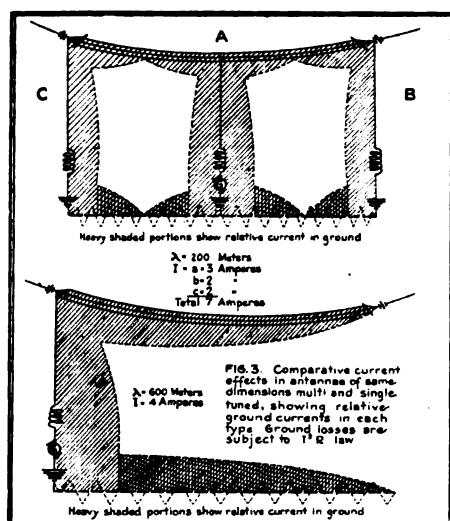
The former method of increasing the size of an antenna system was to increase either the height of the area or length of the flat top, or horizontal portion, or to increase both in proportion. An increase of one hundred percent in the length of the horizontal portion of an antenna is equivalent to merely adding, or connecting in series with it, a second antenna flat top of the same physical dimensions. In other words, it is equivalent to connecting two similar antennas, or their horizontal portions, in series.

In the Alexanderson method we connect the two, or more, antennas in parallel.

Figure 4 illustrates the schematic electrical circuits of series and parallel arrangements of a standard oscillating unit. In this regard attention must be called to the fact that an aerial circuit is in effect an oscillating circuit having inductance and capacity. In figure 4 (A) represents a closed oscillating circuit subject to unilateral impulses from an exterior source. It is well-known that when these superimposed impulses are timed to the exact resonant frequency of the oscillating circuit, an undamped oscillation will be set up in the closed circuit.

With a view of tripling the electrical size of the closed circuit we take recourse to the method shown in (C), that is, we connect the inductances in series and the capacities in parallel. In doing so we triple, theoretically, the power storing capacity of the circuit, but we also lower the resonant frequency to one-third of the former value. In order to obtain the desired increased power storing capacity, without affecting the frequency, we can use the arrangement shown in (B), Figure 4. As all three oscillating circuits are identical in inductance and capacity, they will all oscillate at the original frequency, but the three circuits will, of course, have triple the power storing capacity of a single circuit. This is the fundamental idea of the Alexanderson Multiple-tuned antenna.

As at present used, the multi-tuned antenna consists of a long horizontal "Flat-top" with a number of vertical down-leads, evenly spaced along its length, and each one



individually tuned to the frequency of the transmitted wavelength. In roughly calculating the fundamental wavelength of such an antenna, the length of the horizontal portion is divided by the number of downleads, and the same formula used as for a simple, uni-tuned antenna, or approximately four and one half times the length of the vertical downlead plus the length of the horizontal portion divided by the number of down leads, measured in meters, or $4.5 DL \times H = \text{Fundamental wavelengths}$.

N

$DL = \text{Length of down lead in meters.}$

$H = \text{Length of horizontal portion in meters.}$

$n = \text{Number of downleads.}$

This formula holds good to a sufficient extent unless the downleads are spaced too close together. It has been found that the quantity $\frac{H}{N}$ should approximately equal the length of the downlead.

For best results on amateur wavelengths of two hundred meters, then, the optimum length of the down leads should be fifty feet, or slightly less. The length of the horizontal portion and the corresponding number of downleads will depend upon the power desired to be radiated. A safe rule for medium powers and high efficiency is one downlead for every twenty-five watts of antenna input. When using sets of much higher power than present vacuum tube practice, this may be raised to fifty watts.

For a fifty watt tube set, which evidently will soon be a universal matter, an antenna sufficient for good efficiency will consist of a flat top one hundred feet in length, with a fifty foot down lead at each end. This will be approximately double the electrical size of the average 200 meter spark antenna now in use.

The transmitter, or impuler, is connected in either downlead. It must be remembered that a multi-tuned antenna is not, in the strictest sense of the word, a positive tuned antenna. In other words, it will not oscillate, or electrically vibrate, in the same manner as a uni-tuned antenna, when subjected to an electrical impact or discharge. For this reason it will be found impossible to obtain any satisfactory results with any sort of transmitting apparatus except an undamped, self-timing, radio-frequency generator, of which the vacuum-tube is the only one available for 200 meter operation.

The action of such a generator on a multi-tuned antenna is quite different from the action of a spark discharge circuit upon a untuned antenna. In the latter case the function of the spark circuit is to subject the antenna to impulse the antenna circuit with a series of widely separated and roughly timed impacts, result-

ing in a series of damped oscillations being formed in the antenna circuit. The characteristics of these resultant oscillations, in a well designed set, being mainly determined by the decrement and inductance-capacity ratios of the antenna circuit.

In the multi-tuned installation the process is quite different. A number of oscillating circuits are connected in parallel, and are all simultaneously and equally impulsive in a given direction and at a definite periodicity to which each separate circuit is tuned. In the actual antenna construction these individual oscillating circuits are formed by each individual down lead and the part of the flat top and ground area immediately adjacent to it. The characteristics of the oscillations so produced in the separate circuits are entirely independent from their individual electrical characteristics or inductance-capacity ratios. The impulsing source must be completely self-timing, that is, there must be no reaction of the oscillating circuits upon the timing circuit.

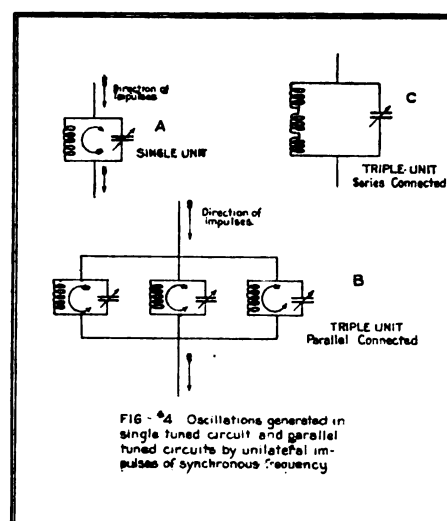
Returning to the above mentioned 200 meter multi-tuned antenna, we will designate one of the downleads the "Timing" lead and the other down-lead the "Oscillating" lead. In such an installation on the grounding system must be made the subject of great consideration in order to secure greatest uniformity of power and current distribution between the two respective down-lead circuits. This can be best done by connecting the ground terminals of both downleads by two lengths of half-inch copper strap, buried several feet in the ground, paralleling each other about twenty to thirty feet apart.

The generating apparatus for such an installation would be preferably a fifty-watt tube used as a radio frequency amplifier, and a five-watt tube as an oscillator for timing same. For telephony an additional five-watt tube can be used as a modulator. In proper construction the frequency and purity of the generated oscillations are entirely determined by the characteristics of the primary oscillating circuit used with the five-watt oscillator, and are entirely free from feed-backs from the higher power amplifier.

The amplifier must be coupled to the antenna circuit in the usual manner, that is, inductively. The oscillating downlead is connected to the grounding system through a radio frequency inductance, which must be of such construction as to be variable to an extremely fine degree.

In the preliminary tuning this inductance is set at its maximum value, which must be somewhat greater than that of the timing lead, which is coupled to the transmitting set. The inductance of the timing lead is then adjusted to resonance with the transmitting amplifier until a maximum antenna current in it is obtained, the oscillating lead inductance is then adjusted until a similar result is obtained in it. It will be found that tuning the oscillating lead will have a tendency to detune the timing lead, and they will have to be alternately readjusted until a maximum total current is obtained.

When properly adjusted the current in the timing lead will be from thirty to fifty per cent greater than that in the oscillating lead, and that the current in either may be considerably lower than that obtained in a uni-tuned antenna of approximately the same physical proportions as the multi-tuned one. In this connection it must be remembered that, as regards the strength of signals at the receiving station, the actual amount of energy radiated off into space will be proportional to the total sum of the currents in both downleads, or in all



the downleads in an antenna of three or more. In the above described installation a fifty watt transmitter should induce about three amperes in the timing lead and about two in the oscillating lead, a total of five amperes. How many one kilowatt spark transmitters can show a good, clear five amperes in the antenna circuit, leaving all consideration of zero decrement out of the question?

Another fundamental advantage of the multi-tuned antenna is due to the basic fact that the total resistance of several resistances in parallel is much less than that of the same resistances in series.

Figure 3 is intended to illustrate this idea more or less clearly. In most shore installations the ground losses are often much greater than the total amount of energy radiated. This is especially the case in the 200 meter transmitter, due to the extremely high frequencies. The ground losses are mainly joulean heat losses, and are therefore subject to the I^2R law, that is, they vary directly with the resistance of the conductor, which in this case is the grounding system, and with the square of the current. Reduction of this loss has heretofore been attempted through the use of elaborate grounding networks of copper cables buried in the earth. In the Alexanderson system this method is improved upon by the reduction of the current carried by the grounding system. Due to the square law, a reduction of current of 50 per cent reduces the ground losses by 200 per cent.

In Figure 3 the heavily shaded portions are indicative of the intensities of current at different points beneath the antenna. The relative areas so shaded in each type of antenna will give some idea of the minimization of losses, which, owing to the second power entering into the formula, are considerably greater than the relative areas would indicate.

By reference to Figure 2 it will be seen that there is a node of current at a point in the flat top between the two down-leads. Where more than two down-leads are used, a node will be present between successive down-leads. In the ideal installation this node will be exactly in the geometrical center of the horizontal sections, but in average practice will vary 10 to 30 per cent. This variation will be due to slight lack of symmetry of form of the different sections of the antenna, as well as variations in various parts of the grounding system, and to neighboring electrical conductors in or near the field of the antenna. Owing to this fact, the amount of inductance which must be introduced in each down-lead will vary somewhat in the different leads.

(Continued on page 430)

JUDGE MAYER SUSTAINS ARMSTRONG RADIO PATENT

AS a result of litigation extending over a period of years, the Armstrong radio "feedback" patent, controlled by the Westinghouse Electric & Manufacturing Company, has been held valid by Judge Mayer.

This patent covers what is probably the most important circuit arrangement in use in modern radio. It made possible trans-oceanic radio communication and has contributed much to the art of radio telephone communication.

The feedback circuit magnifies the signals received by wireless instruments thousands of times, so that signals previously inaudible are now easily readable, and it further permits of very great selectivity, making possible reliable communication between two stations regardless of atmospheric conditions and of the transmission of messages by other stations.

Judge Mayer, in his opinion, says:

"This case is another contribution to the romance which has so often characterized the history of forward inventions. As a boy of 15, Armstrong became interested in radio and erected a radio station at his home. In the Spring of 1912 he began a close study of the fundamental action of the audion and read all the literature on the subject. Sometime during this period, he connected a condenser across the telephone of a simple audion receiving system and noticed that on some bulbs an increase in signal strength would result. It is important, at this point, to realize that Armstrong is a remarkably clear thinker. His achievement was not the result of an accident, but the consummation of a thoughtful and imaginative mind. Step by step he proceeded with the study and experiment. He was obtaining what seemed to him remarkable results, and in December 1912 he had succeeded in improving the sensitiveness of the audion by means of a new connection. The merit of the invention was soon recognized, and the very apparatus of which Armstrong made the invention was subsequently utilized commercially at Sayville, Long Island, shortly after the outbreak of the war in 1914, to overcome difficulties in the reception of signals from Nauen, Germany."

When the United States entered the war, Armstrong, who was then working with Prof. Pupin in the Hartley Research Laboratory, Columbia University, was commissioned as Captain in the Army and served in the Signal Corps, A. E. F., where he rose to the rank of Major. The invention, which by that time had become widely known, was used by the Signal Corps of all the armies in the field for receiving radio messages under the difficult conditions of warfare.

The commercial value of the invention was appreciated at an early date and licenses were taken out by the Atlantic Communication Company, the Goldschmidt Company and the Marconi Company during the years 1914 and 1916.

All radio amateurs are familiar with the circuit. It permits them to receive on a simple small antenna the radio signals transmitted from great distances. Thus it is possible for an amateur in and about New York with his antenna located on his apartment house and us-

ing the Armstrong feedback circuit to hear messages from Nauen, Honolulu, Darien, Norway, Philippine Islands, Lyons, and the great Lafayette Station installed by the Americans during the war at Bordeaux, France. It is also depended upon in the delicate work of direction finding which requires receiving instruments of the utmost delicacy. It was used on the NC Navy planes which crossed the Atlantic.

Prof. M. I. Pupin of Columbia University says:

"Edwin H. Armstrong's contribution to the radio art is epoch making. No one who has employed his feedback can fail to appreciate its eminent value and inexhaustible possibilities. Armstrong made his invention when he was about 21 years of age and before he graduated in the Department of Electrical Engineering at Columbia University in 1913. The regenerative receiver and the regenerative oscillator will always figure among the classical inventions and will occupy a foremost position in the research laboratory, as well as in the commercial wireless service. It entitles Armstrong to a very high place among electrical inventors."

The principal defences urged by the DeForest Company and the American Telephone & Telegraph Company were prior invention by Dr. DeForest and that Armstrong's invention was of a very limited character. Judge Mayer held that Armstrong was the first inventor and that the invention was of a very broad character covering any feedback arrangement.

The DeForest Company was represented by Darby & Darby (Samuel E. Darby Jr., of counsel); the American Telephone & Telegraph Company as amici curiae by Mr. Charles Neave and Mr. William R. Ballard; and Armstrong and the Westinghouse Electric & Manufacturing Company by Pennio, Davis, Marvin & Edmonds (William H. Davis, W. Brown Morton, and Willis H. Taylor, Jr., of counsel) and Mr. Thomas Ewing, all of New York City.

AN APPRECIATION OF LIEUTENANT STONE'S LITERARY CONTRIBUTION TO RADIO EFFORT BY LAWRENCE MOTT

RARELY indeed is a scientific work both successfully that, and of entrancing interest—as an exceedingly readable volume—besides!

Yet such is "Elements of Radiotelegraphy" by Lieutenant Ellery W. Stone, U. S. N. F. R., published by D. Van Nostrand Company, New York.

As one who is keenly interested in radio matters I have read many—very many!—varied—very varied!—and sundry tomes on radio effort and progress. From some I have gleaned bits of useful knowledge, but of the majority, the less I say, the better! And for the reason that I became hopelessly involved in mazes of dry-as-dust figures, scientific to the nth degree, and far above the head of the average radio student.

In his book, however, Lieutenant Stone has succinctly set forth the more salient points that are necessary unto him who has

(Continued on page 431)

CONTEMPTIBLE AND DANGEROUS WORK

By Lawrence Mott
(Associate Editor)

IN slang parlance: let's get down to brass tacks! There are certain amateurs among us who are riding for a nasty fall!

A contemptible case, not only of the mis-use of another's call, but of the deliberate forging of his name to a postcard, purporting to be from him, has been brought to my attention, and to that of the Radio Inspector at San Francisco. Unfortunately the offender has not been—as yet—located, but that he IS in Los Angeles, has been ascertained—and many ears are listening, o' nights, for any future attempts to "fool" some one!

In brief, as I think it well that the matter should be aired, a certain conscientious, earnest amateur in Eureka, California, received a postcard, purporting to be from another eminently trustworthy amateur in Los Angeles. Said postcard reads so oddly that I reproduce it herewith:

L. A., Calif., March 25, 1921.

"Dear fellow amateur:

"I reached you on the evening of March 24th (Thursday) between the hours of 10:30 and 12:00. You came in QSA although I was interfered with a great deal by QRM. I received NPW strong as well as a great many other northern stations. I believe this to be a coastwise record. I will call you again later.

Sincerely yours,

Pardon delay.

—(—)"

On the face of it the thing is an impudent forgery, as I happen to know the script of the **purported** writer—well! And there is no iota of resemblance!

That this is the work of some stupid mischief maker is evident by the fact that he writes of a "coastwise record" (!) and the wording and spelling are both incorrect. There has been a 'deal of correspondence in the matter, which has been forwarded to me in order that I might take the affair up publicly—and I am forced to the brutally frank statement that we have, in our peaceful midst, an out-and-out forger, and a wilful user of another's Call Letters!

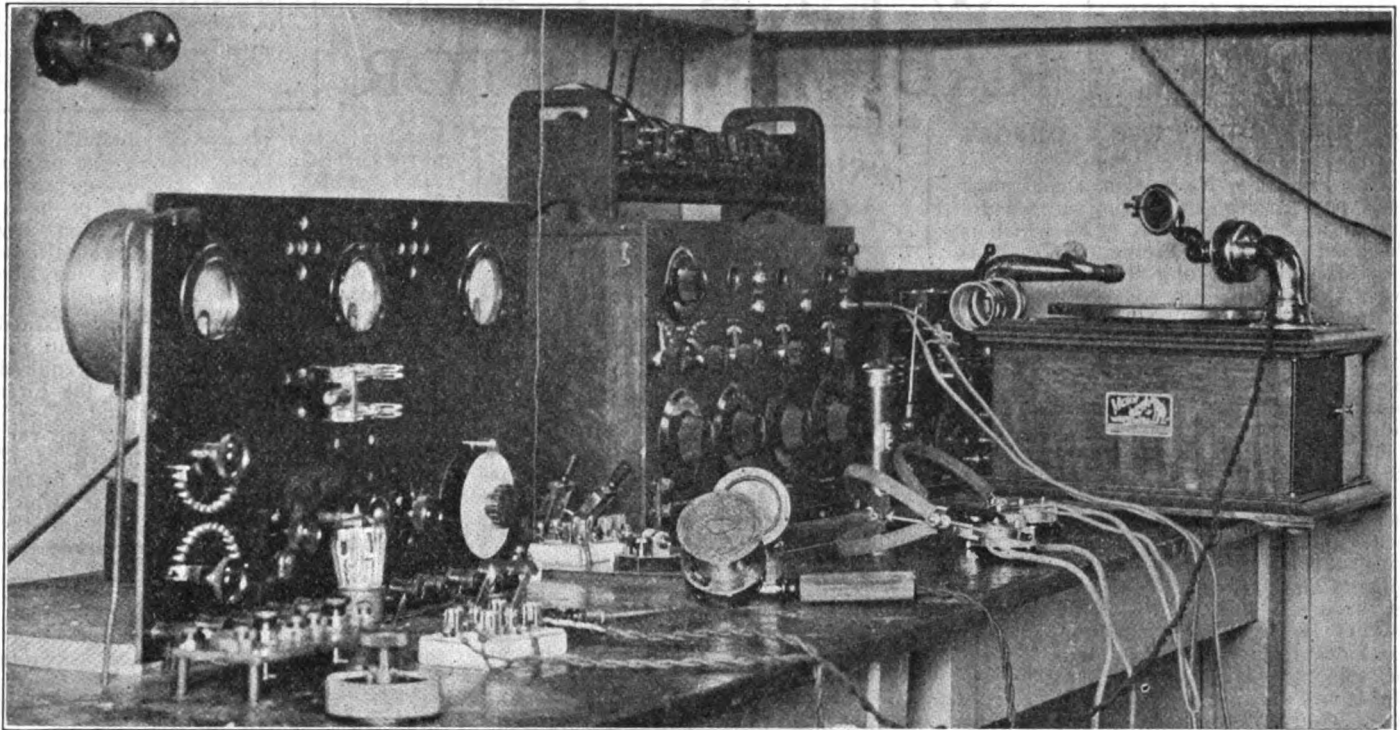
These are the sort of things that put a stigma on amateur radio effort, and that gain for it an ill repute with the authorities! And it is this same sort of recklessly-criminal work that is going to bring down the just wrath of all and sundry on the heads of offenders—and at no far distant date—either!

To me it is a matter of vast astonishment that there is, among a certain kind of amateurs, so crooked and devious a manner of doing things! To deliberately and with malice-aforethought sit down and plan how to try and deceive earnest operators is entirely beyond my comprehension! Where is the "fun" (?) of the thing? What is its object?

Perhaps in no other line of effort does the old saying—"Truth will out"—hold so true as in radio! Law evaders, law breakers, manage to "get away" with it for a time—but only for a time! And the sooner each honorably-intentioned operator constitutes of himself an air

(Continued on page 427)

6XG—THE FAIRMONT RADIO TELEPHONE



ONLY a few weeks ago the many radio experimenters of the Pacific Coast experienced a pleasant surprise in the form of an announcement that the Leo J. Meyberg Company of San Francisco was about to install a radio telephone station in the Fairmont Hotel.

Following closely in the wake of the announcement was the actual opening of the station and the work that it has so far accomplished, as well as the extreme satisfaction expressed by those who have heard the daily radio telephone concerts, proves beyond a doubt that the Fairmont station has set a new efficiency mark for vacuum tube transmission.

Reports have been received that music and voice reception were QSA over one thousand miles. Among the towns reporting are Pullman, Washington; Plainview, Oregon; Boise, Idaho; San Diego, Los Angeles and Hollywood, California; Portland, Oregon and hundreds of others within this radius. At the present time the Hobrecht Elect. Co. of Sacramento is receiving these concerts daily, throwing the music all over their store through a Magnavox. Sacramento is about one hundred miles from San Francisco. Also many other radio houses within this radius are demonstrating the ability of this 10-Watt Radiophone, with Magnavox reception. All reports received state modulation is exceptionally good and very little fading is noticed, although no special care was taken in aerial construction to prevent fading. The aerial is a 60-foot T type, 50 feet high, and a lead in about 50 feet long.

The accompanying photograph shows the entire equipment of 6XG. The transmitter is of the panel type, very compact, and wired in bus-bar style. The Heising circuit of modulation is employed and the emitted voice from the Fairmont phone is free from all distortion.

Station Operates Daily

The Fairmont station is in operation daily from 3 to 4 p. m. A musical program is

provided between the hours mentioned, and also on Monday and Thursday evenings from 8 to 9 p. m. The Leo J. Meyberg Company has installed a large Magnavox in their sales rooms on Market Street and passers-by are invited to listen to the daily concerts.

Visitors are allowed access to the station upon being furnished with passes that are issued by application. All requests are filled in rotation as only a limited number of persons can be accommodated daily. The Fairmont Hotel has long been a center of radio telephone activity, being formerly used by the National Radio Company of San Francisco.

Fairmont to Report Big Fight on 350 Meters

The Fairmont phone will be used to broadcast the returns of the Dempsey-Carpentier fight, scheduled for July 2nd. All radio experimenters within range of 6XG are requested to listen in at 10 a. m., when a musical program will be in progress. The first returns will probably reach San Francisco at 11 a. m. and immediately upon receipt of same they will be broadcast from the Fairmont.

This unique service will be made possible through the co-operation of the San Francisco "Bulletin."

In order to provide entertainment between the fight returns, musical numbers will be resorted to. Various radio and electrical stores in the Bay Cities have installed radio receivers and Magnavoxes in an endeavor to announce the returns long before they reach the outlying districts by the regular wire service.

Constructional Details of the Transmitter

The following apparatus is mounted on a Formica Panel, 18x24x $\frac{1}{4}$ ", and the arrangement can be seen by a careful study of the above photo:

- 1 0-1 Amp. General Radio Radiation Meter.
- 1 0-250 Jewel Milliammeter.
- 1 0-500 Volt Jewel DC Meter.
- 2 General Radio 1 $\frac{1}{2}$ Amp. Rheostats.
- 2 Remler Sockets.
- 1 Acme Modulation Transformer.

2 12-Point Switches to vary aerial inductance.

1 Inductance wound with 36 turns of No. 12 soft-drawn copper wire, on a 3" Formica tube, separated about 1-16" apart, commencing 13 turns from the ground lead 11 taps are taken off, one every two turns and connected to two 12 point switches in parallel.

A Protective Condenser of .001 mf. capacity is used in the plated lead to inductance to keep the DC out of the aerial circuit. This may be dispensed with, if desired. A Dubilier type D182 will answer for this purpose. A radio frequency choke coil may be made as follows:

Take a small thread spool and wind about 300 turns of No. 30 DCC wire, and fasten to binding posts mounted on ends of spool to prevent breaking off.

The Audio frequency choke is made by winding a soft iron core $\frac{1}{2}$ " in diameter, with No. 32 DCC wire, lengths of winding 4" and diameter of same 1 $\frac{1}{4}$ ". This coil is to keep generator coil constant and its use is imperative for the successful operation of the set. A double pole, double throw switch is mounted on panel for changing from voice to buzzer modulator. A Clapp-Eastham Variable Potentiometer, semi-circular, is used for the grid leak. A .0005 mf. Dubilier condenser, type D181, is used for the grid condenser. A DeForest .0015 mf capacity variable condenser is used for tuning, although any standard condenser will work, if of suitable capacity. A Century high frequency buzzer is used for buzzer modulations. The Magnavox tone arm is used for transmitting phonograph music; also a Magnavox hand transmitter for talking. A Western Electric transmitter was tried and gave very good results. The motor generator is a standard 100 watt, 500 volt machine, with a field rheostat of 5000 ohms and a 43 volt variable "B" battery is used for the "C" battery. The full 43 volts is found to give best results. Two 5 watt Cunningham power tubes are used and a radiation of 1 1-10 amperes can be depended

(Continued on page 433)

This Department is conducted by the U. S. Radio Inspectors of the Sixth District.
CO-OPERATE!

WITH THE RADIO INSPECTOR

Questions answered by the Inspector.
No names will be printed.
Initial your letters only.

DEPT. OF COMMERCE SPONSORS NEW RADIO BILL

The Bureau of Navigation, Department of Commerce, is sponsoring a measure known as Senate Bill No. 1628, which is designed to supply some minor deficiencies in the existing Radio Laws and Regulations, and also to provide a permanent committee, which shall have power to formulate such rules and regulations as may be found necessary from time to time, in order to conserve the optimum interests of radio communications throughout the United States.

The bill differs from the one introduced by Senator Poindexter, in as much as it insures commercial control of radio generally, by having the committee composed chiefly of Commercial radio engineers, instead of Naval and Military officers as proposed in the Poindexter measure.

There is every reason to hope that at least one member of the Committee will be selected from among the amateurs and that amateur interests will receive more consideration than has ever been accorded them in the past. In case the bill becomes a law, the efforts of all amateurs should be concentrated upon the personnel of the Committee. Every care should be exercised in the selection of a real live amateur for appointment to the committee, which will be empowered to allot wave-lengths and formulate the regulations which will govern the operation of their stations.

Those Amateur Radioites who believe in the predominance of Civil over Naval or Military Law, during the normal peace times; who believe that our commercial industries and institutions should be governed by Civil, rather than by Military Laws during peace times, ought to take time by the fore lock and express their preference in the matter, otherwise there is danger that some law detrimental to commercial and amateur interests may be enacted. Eternal vigilance should be the general slogan.

DEPARTMENT OF COMMERCE
Navigation Service
Office of Radio Inspector
Custom House
San Francisco, Cal.
June 4, 1921

Editor,
Pacific Radio News,
San Francisco, Calif.
Dear Sir:

I am enclosing a copy of a circular letter, which contains all information concerning the issuance of the new classes of Commercial Radio Operator Licenses, which will clear up, and explain a number of points which have caused a considerable amount of confusion among many radio operators, and others interested, which is effective July 1, 1921.

There are established, under these regulations, the following classes of licenses:

1. Commercial First Class, 1st Grade.
2. Commercial First Class, 2nd Grade.
3. Commercial First Class, 3rd Grade.
4. Commercial Second Class, 1st Grade.
5. Commercial Second Class, 2d Grade.

QUESTIONS ANSWERED By the RADIO INSPECTOR

QUESTIONS AND ANSWERS.

Q.—In calling a person by radiophone will it be permissible to say: "This is John Brown, Sacramento, calling," or must he say: "This is 6—calling?"

Ans.—In calling it will be necessary to say "6—, calling, John Brown calling." The name may be used as shown, if desired, but this name not being the official call, it will be necessary to use the official call at all times, in order that any station receiving may know who is calling.

Q. Is it permissible for a friend who knows nothing about radio to speak into the transmitter when a licensed operator is with the apparatus, and if so, is the licensed operator responsible for his utterances?

Ans. The Radio Laws and Regulations state: "Under the supervision of a licensed operator an apprentice, or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had himself violated the regulations." This refers to radio telephone stations where the communication is by word of mouth as well as by radio telegraph stations, and operators thereof.

6. Commercial Second Class, 3d Grade.

All operators having at least 12 months actual commercial service, which is proved to be satisfactory, as shown by their service records, will, provided they pass a 25 word code speed test, be issued, First Class, First Grade Licenses.

Operators who have six months, or more satisfactory service, but less than 12 months, will be eligible to a First Class, Second Grade License, provided he is capable of copying at least 20 words per minute.

Operators who have never before held a commercial license, or who possess less experience than required for the above grades of licenses, will be issued First Class, Third Grade Licenses. This refers particularly to graduates from radio schools, amateurs, and others who are entering the radio service for the first time. The rumors current of "student grade", and other classes of licenses, have absolutely no foundation, and should be given no credence by anyone.

All operators who hold First Class Licenses, regardless of grade, will be eligible to operate at any and all stations where commercial first grade operators are at present required, without further formality. That is, all ships where two first grade commercial operators are required, will require at least two operators of the new First Class; however, these men may hold any grade of license, although it will, of course, be understood that those holding first and second grade licenses will usually

stand a better chance of obtaining employment than those holding one of the third grade. Third grade operators, however, without any danger of being penalized, hold any position, on any ship, or at any shore station, where first, or lower classes of operators may be required.

Second Class Licenses may be issued to those persons who fail to attain the percentage in the examination required for the issuance of a license of the First Class; otherwise the condition of service, etc., will be the same for the various grades, except that a speed of 12 words in the third grade applies to the third grade second class license, which corresponds to the speed test for the present Commercial Second Grade License.

All persons holding valid First and Second Grade Commercial licenses, which have been issued under the old conditions will continue to operate under these licenses until they expire. At their expiration date, the holder of the expired license will be issued a license of the new classification, the class, and grade depending on the service shown on the previous license, and, in case of applicants for First Class First Grade, the issuance will also depend on the applicant's ability to copy at a rate of 25 words per minute, Continental Morse.

No change in the Commercial Extra First Grade License, which will be issued, upon examination, as provided in the regulations, (Paragraphs 101 to 106, inclusive, Radio Laws and Regulations, Edition Aug. 15, 1919).

There will be no change in the present First and Second Grade Amateur Operator's licenses. All instructions, information, etc., apply to the commercial license exclusively.

Respectfully,
D. B. McGown,
Assistant Radio Inspector.

GRADING OF COMMERCIAL OPERATOR'S LICENSES
Department of Commerce
Bureau of Navigation
Washington

May 6, 1921.

Radio Inspectors and Others
Concerned:

The Commercial First Class and Commercial Second Class radio operators' licenses which replace the Commercial First Grade and Commercial Second Grade Licenses on July 1, 1921, will be issued to applicants who pass the examinations now given for First and Second Grade Licenses.

Holders of First and Second Class Licenses, irrespective of grade, will be eligible for employment in any station now requiring First and Second Grade Licenses.

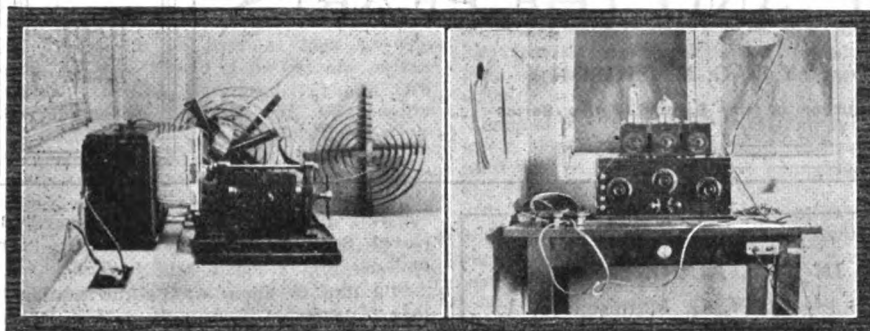
The First Class and Second Class will have three grades each.

The grade determines the service and code speed of the applicant.

The code speed of twelve words in the third grade applies to the Second Class Licenses only.

(Continued on page 416)

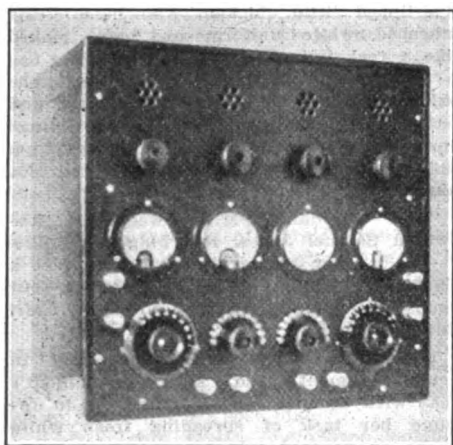
6ZU-FRESNO, CAL.



Here's one of the "select few." 6ZU uses a 1-2 KW Packard transformer, Dubilier 0.007 condenser, Amrad Quenched Gap, oscillation transformer and an anchor gap in the ground lead for a break-in system. A variometer receiving set is used, together with an Acme two step amplifier and Baldy phones. The aerial is of the semi-fan type,

suspended from two 60 foot poles, 50 feet apart.

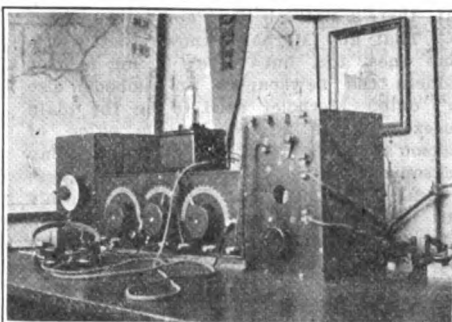
The ground system is unique. A counterpoise of ten wires, 10 feet above the ground, directly under the aerial is used. Stations worked include 7ZG, 7EX, 7BP, 7AD, 7BC, 6ZZ, 6ZA, 6ZH and many others.



-6EA-

This photo shows the receiving set used by H. C. Seefred, 6EA, during the winter months of 1920 and 1921. The usual "Calls Heard" list received from 6EA speaks well for his receiving set, all of which goes to prove that Seefred has efficiency spread all over his station.

6EA has been heard for the first time in the Eighth District. He was reported heard by 8AIB, Dayton, Ohio, about a month ago.



Mr. O. Schuwendt of Fresno, Cal., has discarded his panel spark transmitter in favor of CW and radio telephone equipment. The photo shows his four tube CW set, a description of which will appear in future issue of this magazine. Full constructional details will be given in order that the experimenter can build an exact duplicate of the transmitter.

PROGRESSIVE ACTIVITIES OF THE RADIO CORPORATION OF AMERICA

BY LAWRENCE MOTT
(Associate Editor)

TO write of the activities of a business of such colossal magnitude as The General Electric Company—with which is associated The Radio Corporation of America—is no mean feat! Even to adequately describe any one of its various kinds of manufactures is not a simple matter!

However, I have been most courteously supplied with certain vastly interesting information by Mr. E. E. Bucher, the Commercial Engineer of The Radio Corporation, and the well-known author of many most useful works on radio effort. This information I would pass along for the benefit of PRN readers, feeling rather sure that

herein contained is much of which they have, so far, known nothing, and much that will be of value, especially to CW enthusiasts.

Most amusing letters have reached me from set-in-the-rut spark operators, bitterly decrying CW—and almost in same breath admitting that it IS the only real method of radio transmission, and that it will, eventually, entirely supplant the spark—of ancient vintage!

There has been a great deal of deep and dark "mystery" about power tubes—as all CW men know! Did one have a VT-2, one

(Continued on page 424)

SOME TRANSMITTING TUBE DATA By B. F. McNamee

Chief Engineer, Moorhead Laboratories, Inc.

THE amateur who has just started experimenting with CW generally finds out that he has something to learn about transmitting tubes. The sad fact is that he generally burns out a few while learning. A few precautions are therefore timely.

Of course, we all know that an overdose of voltage across the filament terminals will soon terminate the activities of any respectable vacuum tube, but only a few seem to realize that there is any other method of overloading a transmitting tube.

It is not safe to operate a tube on high plate voltage without a plate current meter. This should be a D. C. milliammeter having a range suitable to the size and the number of the tubes used. The correct plate current for any particular make of tube should be obtained from the manufacturer, as the life of the tube depends very much on how closely one conforms to this rating. With a plate current of 20 milliamperes the life of an A-P transmitting tube is about 250 hours, while if the plate current is kept down to 15 milliamperes the life is about doubled. It is easy to obtain a plate current of 50 or 60 milliamperes through one of these tubes, but its life under such conditions would be about half an hour.

When an amateur has been obtaining an antenna current of several amperes with his park set, and starts CW work, it is most natural that he would try to obtain just as much. Many articles in former numbers of QST have shown that a small CW antenna current will carry as far as a spark set having an antenna current many times greater. The writer has obtained as much as one ampere in an average amateur antenna from a single A-P tube; the space current was excessive, and the life of the tube some twenty minutes. Consequently, a boast about high antenna current from a small tube set means nothing as to the ability of the boaster; it really means inefficiency when one considers the ratio of output to upkeep.

A case somewhat analogous to overloading a tube would be attempting to use a one-horsepower motor on a two-horsepower load. The motor might revolve with such an overload, but it would draw about twice as much current from the line, would heat badly, and would soon burn out.

Because a tube will oscillate with a full six volts on the filament is no reason why a filament rheostat should not be used. After a tube has started oscillating it is generally possible to cut down the filament current quite a bit without decreasing the antenna current. This will, of course, lengthen the life of the tube. The filament of the A-P transmitting tube is designed to work on six volts with a rheostat in series. The filament current is .75 to .8 amp.

Recent tests made at the University of California by Mr. A. K. Aster of the Physics Department show that the resistance between adjacent prongs in the condensate base of these tubes is 100 megohms. The measurement was made with 1500 volts D. C. Moisture in the atmosphere has no appreciable effect on this result.

The results obtained with the A-P transmitting tube show that CW is not only the solution of the QRM problem for the amateur, but the means of carrying on the long distance relay work as well. The achievement of Mr. Hugh Robinson (2QR) of talking to Scotland was accomplished with four of these tubes. Very recently Mr. R. Rheem (6AH) of Oakland, Cal., talked to Los Angeles with the same equipment in daytime. Both these amateurs were using rectified A C on the plate.

THE GIRL AND THE PEARLS

BY V. G. MATHISON

Author of the Samuel Jones Series

SAMUEL JONES has got into the lime-light for fair. There appears this morning in one of the 'Frisco papers this headline:

**"WIRELESS OPERATOR OUTWITS CUSTOMS
SMUGGLES PEARLS WORTH THOUSANDS"**

Beside this front-page caption there is a real picture of the notorious brass-pounder and below comes this amazing item:

"In spite of a minute search and an extreme watchfulness on the part of the local customs inspectors, Samuel J. Jones, the chief wireless operator of the big passenger liner 'La Hermosa,' just in berth from Panama and Mexican coast ports, is believed to have successfully smuggled ashore a package of pearls, said to be worth \$225,000.00."

"The details surrounding the affair are most extraordinary. The pearls, which belong to the well known mining millionaire, Carter Jackson, are alleged to have been stolen from him last summer by Lucerita Carmello, a Spanish dancing-beauty, rumored to be one of the mining man's former flames, who, gaining access to a private safe in his residence at Burlingame, secured the pearls and disappeared. The jewels were eventually recovered in Mexico City; but when Mr. Jackson had them brought up on one of the Pacific Mail steamers, he was informed by Rudolph Merboler, in charge of the local customs, that since there was nothing to prove them the identical ones stolen, and, in fact, nothing to prove that the originals had ever been lost at all, the pearls from Mexico City would not be admitted without the payment of the full duty, which would amount to almost ninety thousand dollars. At a Federal hearing, the decision of Merboler was sustained, but Mr. Jackson, declaring the duty had been paid once, when the pearls were originally brought in, refused to pay it again, and sent the jewels back on the Mail steamer to Mazatlan."

"It appears that when Jackson formerly lived on his copper-mining properties at Santa Rosalia, in Lower California, he owned a yacht, the 'Querida,' upon which Samuel J. Jones was for a time radio operator. It is said that the wireless man stands on a remarkably friendly footing with his former employer; and when the difficulty over the pearls arose, he offered to run them through the customs for the other."

"Merboler, learning of the plan, put a small package agent on board the 'La Hermosa' last trip, who saw a small package delivered to the radio man, when the ship touched at Mazatlan, northbound. Upon the liner's arrival yesterday, the customs inspectors went over the ship with a fine tooth comb, without finding anything; and though every precaution was taken to prevent the pearls being smuggled ashore;

IN THE AUGUST ISSUE

Mr. V. G. Mathison

will tell you what happened to Samuel Jones while acting as Radio Operator in an Alaskan codfish village.

A HARD BOILED BUNCH

is the title of the next story.
It's great!

nevertheless, it is rumored that Carter Jackson received them safely last night."

"Well, I don't see nothin' wrong about it," insisted Samuel Jones, blinking a rather black-looking eye, as with his friend Cunningham, he stepped out of the elevator, on the way to lunch; "Jackson paid the duty once; si why should he pay it again?"

"No-o, not if they're the same pearls," qualified Cunningham.

"Well, they are," averred Samuel Jones; "On the last trip of the 'Querida,' when Jackson moved up here to Frisco from Mexico, the pearls was on board then, an' I saw 'em declared; six in a settin' an' forty-one in a string—some beautes, too!"

"But that don't prove these are the same ones," doubted the audiotron man.

"If you'd seen 'em, you wouldn't say that—there's nothin' like 'em in all Mexico. That guy Merboler knows they're the same ones, too, but there's a lot to this business the newspapers an' nobody else ain't onto. Merboler used to be the main squeeze in the Frisco branch office of Jackson's mines; but; finally, one day Jackson caught him in a dirty, double-cross-in' deal, an' kicked him out—an' not only that, but Merboler was after that Spanish jazz-baby himself, an' he's got a grudge like death against Jackson because he beat his time—believe me, I know all the ins an' outs of this racket."

"Perhaps you're right. At any rate, you were lucky to get by the customs men as you did."

"Humph, that's somethin' else the fool newspapers ain't onto," sniffed Samuel Jones; "I had a hunch somebody'd gave me away, an' so—he paused and looked around, cautiously, "—an' so I never brought the pearls up a'tall. Jackson's makin' the papers an' everybody else think he's got 'em, so's to put Merboler off the track; an' I'm really bringin' 'em up next trip—but, here, come with me: I'm goin' to show you a new eatin' joint."

With this abrupt shift of the subject, Samuel Jones led Cunningham to a large marble basement-stairway.

"Say, here, where are you going," objected Cunningham, reading the inscription, "Leighman's Cafeteria;" "I thought you said you wouldn't eat in a cafeteria."

"Well, I'll eat in this one, anyway," declared Samuel Jones, determinedly; "come on."

"I'd like to know what's the confounded idea," protested Cunningham, ten minutes later, as carrying a large luncheon-filled tray, he stumbled over somebody's umbrella and narrowly avoided a disastrous collision with the rear end of a detestably fat woman; "you know I never had any use for these wait-on-yourself places; and you always said you wouldn't be found dead in one of them—and now here—!"

Cunningham's complaint died on his lips. Approaching their table was a dream of girlish deliciousness, a Venus-shaped, rosebud-lipped little chicken, who in a stiffly starched white uniform and cap, looked like a real, living doll.

"How are you today, Mr. Jones," she asked, glancing shyly at Cunningham; and bestowing a charming smile upon Samuel Jones, as she began taking the dishes from his tray and carefully arranging them for him on the table.

"Fine an' dandy, Miss Sweetness," answered Samuel Jones, returning her smile, "—an' I know you are, too, if you feel a thousandth part as good as you look—but excuse me—Miss Lillian Vernaldt, Mr. Cunningham."

The little blonde smiled demurely in acknowledgment; and, after a moment's chat with Samuel Jones, drifted off to resume her task of spreading fresh white linens on vacated tables.

"No wonder you insisted on coming down here!" exclaimed Cunningham, admiringly, as he watched the girl threading her way among the crowded tables; "some little peach, all right!"

"Well, you don't need to gape your confounded head off!" growled Samuel Jones, with ill-concealed jealousy, "I brought you down here to eat."

"Go ahead and eat, yourself, and quit looking so green in the face," retorted Cunningham, good humoredly. "But, joking aside, she is a pippin. How did you happen to meet her?"

"By gettin' this," enigmatically answered Samuel Jones, tenderly feeling his blackened left eye.

"What, did she give you that?"

"No, of course not!" exclaimed Samuel Jones, indignantly. "You know, last night I was out to Burlingame to see Jackson an' tell him why I didn't bring up the pearls this trip. I left his place about ten o'clock, an' was standin' just outside his high iron lawn-fence, when all of a sudden, somewhere pretty close, I hears a scream. There's lots of trees along the streets out there, makin' things pretty dark; an' right in the darkest place, I hears somebody scufflin'. I advances along the sidewalk, navigatin' pretty cautious like at first, but when I gets up close, I sees it's a girl grapplin' with a fellow. Course then, right away, I rushes in an' slams the guy one—an' quick as a cat, he turns on me, an' cracks me right square in the eye! Believe me, that was all he ever did, too!—I just

lit into him an' hammers the everblastin' daylight out of him, finishin' him up with a tap under the jaw that lays him out on the sidewalk. I was thinkin' of calling a cop to cart him to the cooler, but first I lights a match to have a look at the geiser; an' who should it be but one of the cadets on the 'La Hermosa.' Though he's been on the ship only a trip, I'd already sized him up for a sneaky, yellow-livered skunk, an' I had no use for him, but when I recognizes him there on the sidewalk, I thinks to myself that shipmates is shipmates, an' he's probably only full of jack-ass moonshine, anyway; so, instead of callin' a cop, I just disposes him comfortable in the gutter an' leaves him there. Then I takes Peaches-an'-Cream home—an' that's how I met her."

"She lives near Carter Jackson, in Burlingame, then?"

"No, she lives in Oakland, but last night she was out to Burlingame to visit a sick friend, she said."

Cunningham suddenly became thoughtful. "That sick friend business is surely old stuff," he remarked, cryptically.

"I don't get you."

"I mean, I think you're a bigger sucker now than you were ten years ago fresh from the hay ranch. On the identical night you go to Burlingame, this girl, who belongs across the bay in Oakland, happens to be way out there; and just at the very minute you come out of Carter Jackson's place, she is attacked right close by—and then you fall for a silly story about a sick friend, and forget all about the fact that right now you are the object of a lot of attention on the part of certain government officials—for you know, they may have a suspicion that you haven't brought up those pearls yet."

"An' this little chicken picked up the cadet somewhere, an' slipped him a five or a ten spot to start all the racket last night—she's the queen of the secret service out to string me, I s'pose, huh?"

"She's mighty pretty and clever looking to be working here." Cunningham was serious.

"Aw, fergit it!" scoffed Samuel Jones. "Because some of the hams use your audion bulbs till they get dark inside an' burn out from pure old age, an' then send 'em back to you an' say ther're no good, you're beginnin' to think the whole world's crooked! Anybody can see that this is just a sweet, jolly little dame—"

"Oh, you're in love again—and every time you fall, you fall harder. Come on and eat, if you're going to."

One afternoon, a few days later, Samuel Jones was leisurely strolling down Market Street. It was Thursday, Lillian's day off, and Samuel Jones was going to meet her at three o'clock. She had expressed a desire to see the "La Hermosa" and he was going to take her down to the Mail pier and show her over the big ship. Drifting down Market Street, Samuel Jones paused before a big show window, filled with a dazzling display of artificial diamonds and pearls. He lingered thoughtfully before the window for a few minutes, and finally entered the store.

Later emerging, he wandered on down Market; abstractedly turned into Battery, and, almost before he knew it, found himself in the chili shadow of the customs house. Involuntarily quickening his step, he was about to hasten by, but chancing to glance up at the entrance, who should he see coming out of the revolving door but Lillian Vernaldt. Samuel Jones stopped, abruptly, and then the girl saw him.

"Oh, hello," she smiled, coming to him;

"I never thought I'd meet you down here."

"Well, I never expected to run into you here, neither," answered Samuel Jones, constrainedly.

"I just came down here a few minutes ago looking for sister," she replied. "Sis is a stenographer here in the hydrographic office."

Samuel Jones looked penetratingly into the sweet young face, but he could read nothing of deceit in it. If she was stringing him, she was indeed an artist.

"I was just wanderin' around killin' time, waitin' for three o'clock," he remarked, rather awkwardly. "Shall we go down to visit the 'La Hermosa' now?"

The girl assented, and they took a car to the Mail docks. Assisting the little blonde up the ship's gangway, Samuel Jones observed up on the bridge deck, the hulking figure of the cadet he had thrashed the night at Burlingame.

The fellow looked as though he had just returned aboard from his long drunk, and Samuel Jones wondered that the man had not been discharged from the ship. His clothes were soiled and rumpled, and his coat-tail was conspicuously ripped. Catching sight of the girl and her escort, he slunk out of sight into the wheel house.

Samuel Jones spent an enjoyable hour showing his pretty charge over the big liner. At last they came to the wireless room.

"This place looks pretty good now," remarked Samuel Jones, after he had gone through the time worn explanation of the radio equipment, "but you ought'a seen the shack the first day we came in, after that blasted customs bunch got through with it: It sure was a wreck, all right."

"What's this funny looking thing for?" curiously asked the girl, picking up the shiny brass mouth-piece of the wheel house speaking tube.

"That's what I hid my pearls in last trip," jested Samuel Jones, taking the tube from her hand. "You see, there's a whistle in the mouthpiece that's held shut by a spring; an' so all I had to do was to slip the pearls into it and—but I'll be darned if that confounded whistle hasn't fell out again!"—Stooping and searching about the floor, he picked up a little conical metal object. "I don't know what's the matter with this blamed thing," he grumbled, scrutinizing the convex disc closely, "It seems to keep fallin' out of the mouth piece all the time, lately—"

"Oh, mercy, do you know, what you just said about those pearls of yours reminds me of something I was going to tell you,"—broke in the girl, a troubled look in her pretty eyes. "Remember, just now, I told you about sister's working in the hydrographic office?"

"Yes," prompted Samuel Jones, wondering.

"Well, oh dear, maybe there's nothing to it, but sister told me just last night that as she was going down a corridor in the customs house yesterday, afternoon, she heard some men telling another one that you haven't brought those pearls at all, as the papers say you did; and she said she heard the man say he was pretty sure you would have them with you next trip."

"Sufferin' wildcats! Jackson was right!" ejaculated Samuel Jones, half-involuntarily. "Who?"

"The man the pearls belong to," answered Samuel Jones. "You know, the reason I was out to Burlingame the other night when I met you, was to tell Jackson why I'd left the pearls behind last trip: We was in his library, which has a big French window openin' onto his garden, an' somehow he

had a hunch all the time that somebody was snoopin' around outside listenin' to us—an' I guess he was right, too!"

"Then you actually are going to bring up those wonderful pearls next trip?"

"Yes, I'll have 'em next trip, all right; an' I don't give a whoop if that confounded customs crowd do know it—they're only a bunch of boneheads, anyway."

"And are you really going to put them in that thing there?" she queried, wonderingly, pointing to the speaking tube, which Samuel Jones still had in his hand.

"No, I was only jokin' you about that—that's the first place they'd look," answered Samuel Jones, smiling at her innocent credulousness. "There's all kinds of places to hide a little package like that aboard this big ship, but the idea is to put it in something it can be slipped ashore in—an' believe me, I've got a humdinger of a scheme for doin' it, too."

"How?" she asked, simply.

Samuel Jones seemed unconsciously driven on by the little blonde's infantile gaze of wide-eyed curiosity. Opening a locker, he took out an audion B-battery.

"You see, this thing is all full of little dry cells," he explained, holding the object up to view. "Now, s'posing, I take this battery to pieces an' dig the filler out of every cell, I can put two or three pearls in the bottom of each one; then I can shorten up the little carbons an' put 'em back with the filler; seal up the tops; an' finally put all the cells together in the box an' run it full of the sealing-compound. If the job's done careful, it'll look natural; but the best of it is, the B-battery will give juice, same as ever, an' I can put it right into the receivin' cabinet an' use it. Then, when we get into Frisco, I'll bust a wire or somethin' in the cabinet, so the wireless company's inspector'll have to send it ashore to the shop. The B-battery will go with it; an' it'll be no trick for me to breeze into the shop long about lunch time an' get the battery out—an' the stunt's all done."

Once more the "La Hermosa" made the run to Panama. Northbound, at Mazatlan, the package of priceless pearls were delivered aboard, into the hands of Samuel Jones; and the audacious brass-pounder made but little effort to conceal the fact.

In the course of his watches north, he carefully took apart, and reassembled, the spare B-battery. Having brought some extra sealing compound along for the purpose, he did the job with such minute and painstaking care that when finished the B-battery appeared to have never been tampered with. It showed an almost normal voltage, and Samuel Jones put it into the receiving cabinet, removing the other one.

The night before the arrival of the "La Hermosa" at San Francisco, there came a message from KPH:

"Jones La Hermosa Found serge Beware Jackson."

A strange message; but Samuel Jones thought he understood it, and he smiled, grimly.

Almost before the big liner had dropped anchor in quarantine, the customs' tugboat was alongside. Samuel Jones sat in the radio cabin, calmly awaiting developments. He had not long to wait. The wireless room door was thrown open, and in marched two inspectors. With them was their blotchy-faced, coarse-featured chief, Merboler himself. Also in the party, and carrying his tool kit, was the sour-tempered wireless

(Continued on page 422)

CORRESPONDENCE FROM OUR READERS

PAUL F. JOHNSON
2940 Maiden Lane
Altadena, California

Pacific Radio News,
50 Main Street, San Francisco.

April 12, 1921.

Dear Fellows:

Here is a list of calls I have heard during the first three months of 1921, arranged in a different manner than usual. Several lists similar to this from different parts of the Sixth and Seventh Districts would give a fair idea of what stations may be worked. All are QSA or I would not hear them, being partially deaf, and none are listed that I am not fairly sure of.

Place	Distance	Calls Heard by 6ABA
Pasadena	Less than 25 miles	6FU 6GD 6GH 6GP 6HJ 6KS 6PC 6RN 6WH 6ACB 6ACY 6ADL 6ADN 6AGS 6ALD 6ALL
Alhambra	" " "	6DS
South Pasadena	" " "	6OD
Glendale	" " "	6ID 6OL 6OY 6AGM
Los Angeles	" " "	6CU 6EA 6EB 6EF 6EK 6EL 6EN 6ER 6FT 6GI 6HY 6IQ 6IU 6IX 6JD 6JG 6KA 6KP 6KY 6LC 6MF 6MK 6MN 6MO 6MW 6TL 6VZ 6AAB 6ABG 6ADG 6ALU
Baldwin Park	" " "	6IS
Whittier	" " "	6NY 6AHA 6AJK
Huntington Park	" " "	6WS
Sherman	" " "	6TY
San Fernando	" " "	6JM
Anaheim	28 miles	6AAG 6AGN
Wilmington	30 miles	6ADX
Long Beach	33 miles	6IF 6ABP
Santa Ana	35 miles	6ED 6PQ
Laguna Beach	50 miles	6SK
Avalon	60 miles	6BX
Fresno	195 miles	6DH 6DK 6NF
Pacific Grove	275 miles	6ACR
Santa Cruz	290 miles	6DP 6OW 6PR 6ABM
San Jose	300 miles	6AT 6CO 6GY 6PO
Stockton	310 miles	6KM
Stanford University	315 miles	6AE
Hayward	325 miles	6FN
Burlingame	330 miles	6ZR
Walnut Grove	335 miles	6AK 6EJ
Rio Vista	335 miles	6NT
Alameda	335 miles	6AN
Oakland	340 miles	6CC 6FY 6FX 6JR 6KL 6LN 6ABK
Berkeley	340 miles	6EX 6QS 6VH 6ACM 6JN
San Francisco	340 miles	6AC 6AF 6AP 6CH 6OC 6PD 6AKH
Sacramento	355 miles	6GF 6GN 6IC 6NC 6WG
Roseville	360 miles	6AIW
Napa	365 miles	6ACA
Grass Valley	380 miles	6DD
Santa Rosa	390 miles	6AID
Colusa	405 miles	6TC
Willows	430 miles	6LU
Ukiah	435 miles	6AGF
Richfield, Utah	450 miles	6ZH
Douglas, Ariz.	530 miles	6IG
Eureka, Cal.	560 miles	6ND
Salt Lake, Utah	570 miles	6JT 6NQ
Silverton, Ore.	795 miles	7IN
Pullman, Wash.	865 miles	7BQ

If I have made any errors, I hope I may be corrected.

Yours as ever,

PAUL F. JOHNSON (Radio 6ABA).

FULLERTON UNION HIGH SCHOOL
Fullerton, Calif.
May 17, 1921

Mr. Lawrence Mott,
Associate Editor, "Pacific Radio News",
Avalon, Calif.
Dear Sir:

In looking over the last issue of Pacific Radio News I find an article by yourself, in regard to CW transmission and will say that it surely sounds good to me.

I am not a professional wireless amateur like yourself, but for the last year I have been seeking the mysteries of this most interesting subject and have come to the conclusion that CW is the superior of all wireless communicating methods.

I am an instructor in manual training in the Fullerton Union High School and have had about twelve complete receiving stations built by boys taking work in my department. I have advised some twenty or more from the surrounding grammar schools in regard to work being done by them. Some of these stations are very original in their construction and are giving fine service.

Some very complete sets have been built and enclosed in desks that when closed show nothing that would be out of place in a drawing room.

My department has handled about \$1200 worth of supplies purchased through the Western Radio Electric Co., Los Angeles; and used by the boys in making their sets.

I feel that no "up to the minute" manual training man can afford to ignore the enthusiasm of the boys for wireless. Every field that is covered in the manual training shops is brought out in the radio work and I find

that if boys work on projects that appeal to them the problem of discipline takes care of itself.

We have done nothing this year in the building of sending sets but we expect to delve into that part of the art next school year. We are preparing to build six one hundred watt five-hundred volt motor generator sets, frame of motor and generator, base and coupling to be of aluminum. Field laminations, etc., we are buying from the Westinghouse Electric Co.

We expect to use the celebrated "Helsing Circuit" with two five-watt Cunningham tubes, one modulator and one oscillator. Plate voltage and filament current furnished by the unit we are building.

I understand you have had a great deal of experience with this circuit and others using CW and would be pleased to have any information you can supply us.

I would like to inquire through the medium of your paper, as to what other schools are doing for their boys in the radio field. We would be glad to furnish you with photographs, circuit diagrams and a short history of our experiences in building one of our best sets, if you should care to publish them.

Hoping to see many articles in your paper, contributed by the manual training men of the state, telling of the work they are doing in the wireless field and giving their opinions of the benefits derived by the boys in doing Wireless Work in the Manual Training Department. I am.

Yours for a greater CW Club in Southern California,

(Signed) E. A. AMES.

WITH THE RADIO INSPECTOR

(Continued from page 412)

The first license of either class issued an applicant will be marked Third Grade.

After six months satisfactory service in the Third Grade the operator can have his license marked Second Grade, provided he has passed a code test at the rate of twenty words a minute, sending and receiving.

After twelve months satisfactory service in the Second Grade the operator can have his license marked First Grade, provided he has passed the code test at twenty-five words a minute, sending and receiving.

For the purpose of grading service must be rendered under the class of license held, and any service credited on the Second Class License will not be applied to the First Class Licenses.

In renewing licenses which were issued prior to July 1, 1921, holders of Commercial First Grade Licenses will be issued Commercial First Class Licenses, and holders of Second Grade Licenses will be issued Second Class Licenses. The grade will depend upon the previous service record under the class of license held and passing the code test required for the grade.

The grade should be followed by the date effective and initials of the radio inspector in his own handwriting.

Outstanding First and Second Grade Licenses will be valid until they expire and will not be graded under the new rule until the renewal license is issued.

(Signed) E. T. Chamberlain,
Commissioner.

SIX Stages of audio frequency amplification

See John Firth & Co.'s August advertisement

CORRECTIONS

Mr. 6ANL'S name was spelled Cenner, instead of Conner, in a previous issue of the PRN. Beg pardon, 6ANL, perhaps the printer ran out of "O's."

6IQ tells us that they have changed the name of the street on which he lives. His address is now 323 North Brannick Street, Los Angeles, Calif.

ERRATA

Owing to the printers' numerous errors in substituting English characters for the conventional Greek letters used in the formulae of the original manuscript, the following corrections are made.

Under Fig. 1, page 367 of the June installment, correct to read as follows: "section of the coil is of any shape and its dimensions are small compared with the axial length, is

$$H = \frac{4\pi NI}{10}$$

(lines per square centimeter)

If a bar of some magnetic substance such as iron is substituted for the air core, a flux density,

$$B = \frac{4\pi NY}{10}$$

will be produced in the iron for every ampere turn.

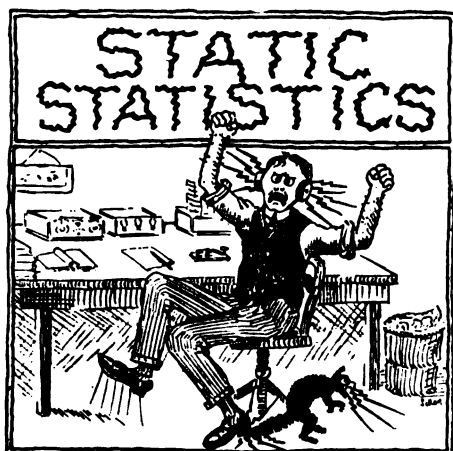
B

The relation, $\frac{B}{H}$, represents the perme-

ability, and for low degree of magnetization, its value in iron may be as great as 6000."

To avoid errors from a similar source in the installment for this month, the following nomenclature will be used:

Y—Permeability.



By SQUAWK MCGUFF

Well, boys, at the time of me closing this here column, account old man Dickow say-in' as how his magazine must go to press right now, I see that KET is still on 200 meters with that fish horn note and I wanna make a motion here and now that KET confines his fish-horning to Fridays. I thought his spark was the fish man and sent the kid out for two-bits' worth of hall-but. He sure comes in fine on us guys' waves. Maybe if he could get a couplamore amps it might be more QSA and sell more fish. At present, I suppose acct his broad wave, he can only be heard a thousand miles. I don't see why he don't tune sharp on 200. Rattlegap told me that a guy had to tune sharp for efficiency. How can he get efficiency working on every wave in the fourth dimension? The Department of Commerce has sure got to hand it to us amachewers for working out knotty problems in this here ether stuff. We have now come to a point where we compete with KET, NPG, the Tigh Tenshun Power Company and 6ZR.

I notice a lot of competition lately between the phones and the sparks. I don't know which will win, but hurry up and get it settled one way or the other. I ain't getting much concert lately.

EXTRA! EXTRA!! All about de big debate between 6SN and 6AAW.

"You are very broad—what is your coup-ling?"

Incidentally 6APH entered, but under protest was debarred by the Chamber of Commerce for one day.

Mr. Hadley, prominent among us, has entered a vigorous protest against the phrase of 6XW at the end of each selection of "Just a minute, please, and we'll have another." This, he says, is reminiscent of the days when schooners went over the bar without antenna or ground. However, the bulbs would oscillate freely and the boys could send to beat the band. With a shot of the present-day "Jackass," I think a much greater speed could be attained.

"Just a minute and we'll have another."

Gee, that last one was clever, wasn't it? I had a swell job in the army. I was a pilot. PILOT. The lieutenant would say: "Pileut here, pileut there, and pileut in the coal shed."

That's old stuff, though. But when all amateurs quit scrapping and when 6ZK outworks 6ZR—that's new stuff.

Two Japanese fishermen were returning home late one night and discovered in the vicinity of the old KPH station a rather wierd jovicentric artist walking around with a fish pole in the air with a box attached underneath. After sizing him up they finally decided he was harmless, at least for the time, and gained courage to inquire as to his purpose.

"I'm fishin' for leaks. High tenshun leaks."

Now these Oriental gentlemen were seasoned disciples of Isaac Walton and were at a loss to think of any animal in their piscatorial profession called "High Tenshun Leaks." However, it might come under the category of flying fish. So they hailed a protectorate of the law, commonly known as a "cop," who, in turn, was not satisfied with Watkins' explanation. He landed in the "hoosgow."

The judge, not being a Batchelor of Sci-

ence, was rather dense as to the meaning of it all. It took a lot of valuable time explaining to the elicitious judiciary how he would go to each pole transformer hunting a leak that had been bothering KPH for some time.

Finally the judge decided to dismiss the case, but the medical examiner (who tells us whether we are bughouse), shook his learned head. He was not satisfied as to whether the young man was a catatoniac. He should be held on the charge of fishing without a commercial license.

A grizzled old grandpop of the way back days was talking with another alfalfa-chinned veteran of the sixties. "By gosh, Ezra, what's comin' nex'. Submerines, air-ships, wireless telyphones, and now I hear the boys cussin' about AIR HOGS. That's what I calls scientific farmin'."

6IC, the Sacto wiz, has come to the conclusion that his set is spoofing his jazzalations. But if he will look for that little green wire the fellers run from his lead to the ground once in a while, he might be more solid financially. As a tip, my dear 6IC, the next time them gamblers want to wager you can reach the city limits, ask them if they can buy any mothballs and go hunt the little green wire.

Boys, I sure got a sticker in the mails the other day. Of course, me being a EX-PERT, I don't very often have to go outside if the US for advice, but this bein' so hard, if I haven't got it correct, please advise:

QUESTION: I have a one inch spark coil which I operate on two dry cells. My radiation is 50 amperes at the terminals of the oscillation transformer but only 10 amperes in the antenney. Hw pls?

(Signed) Herbert, Vacaville.

ANSWER:

My Dear Herbert,

Way up in Vacaville:

I had one whistletree of a time locating that town of yours on the map. I also had a lot of difficulty in ascertaining your exact trouble, as you see above. But after all it's so simple I have to laugh at myself. Simply run your antenney down hill. Current follows the line of least resistance. Hoping I can be of further valued assistance, as I always like to help the boys, I am,

S. Quawk McGuff.

6UQ has that far-away oil tank swing accompanied by a spark of distance characteristics, that fading, fading, jazzy, ringy tone. Sometimes when 6UQ is radiating four and six elevenths, he gets as far as the beach. This inaugurates bookkeeping. Everybody in SF logs him for a DX, including 6CFH.

6AR in store asking for fone cord.

"How much does it run for?" he asked, anxiously fingering his pocket.

"Oh, quite a ways for \$100," said the clerk.

Have you noticed NPG's hump on our 11' ole' tantalizing 200 meters? 6WZ, who is some sort of a navy expert or other, probably other, says that they are working on it. I thought he meant working to eliminate it. However, he was WORKING ON IT last night and it came in so good I sent him a card thusly: "Heard you QSA last night. OM, what are you using? How do you get me? 73. Ans. soon."

Just to show my clientele how the Chinese are progressing, I am publishing a letter received by 6XG complimenting him on the new addition to the air versatiles.

Mr. Radio Experiment Station,

Dear Sir:

Hello, hello. This is first time I write you, yes, yes, your voice he come in like 5 thousand tons chop-suey, sharp as razor. I can hear the music when I leave my phone 20ft away from me. My received set is reglar Chinese model. 3 flat coil, as 1 for pri, 1 for sec, and other for tick. Dector set consist of 2 blow-in jar. Double filament. A bat 2 volt, b bat 10 volt, c bat 40 volt. No d bat. The above apratus is my hmmekeple, never had any burnt-out trouble. When comes weak point I stick in new one, no trouble. I wish you find me record name Jolly Copersmith, if so please give number of that record. I guess that about all for me. Hell, goodbye.

Yours truly

Geo. S. Chong.

Radio Eperimenter Station, Flisco, China-town.

HIGH POWER STUFF

I been in this biz since nineteen six, Which is a very long time ago, But since listening in each night I got a whole lot yet to know.

Fights are going on each night, War is hell, no doubt; But Sherman never seen a fight That compares with a wireless bout.

I try to work some DX bird At some far-off distant point, When in comes 6EX and knocks My ear-drums out of joint.

They tell me that I'm very broad, Also tell me QRX and QRT. And when I try to get in They write to 6ZE.

"Close up your bloomin' station," says he, "You're making too much noise," But I couldn't figure it out at all Unless radiating off the counterpoise.

But alas! I have human patience; In short, I'm getting sore. If one K. W. is not enough I'll put in twenty more.

That seems to be the spirit, So everybody get their best. Get yourself a United Coffin And 6ZE will do the rest.

WAILINGS FROM L. A.

Be careful how you send at night Squawk M'Guff may be in L. A. Or he may have a listening guard So be careful what you say.

You said something, Brother Poet, and I observe that if 6EB would work as hard at the key as he does at changing things he might be picked up by the League of Nations. Those are pretty nice instruments, Lyndon. Verafine indeed.

And I further observe that if a feller is sending himself at the wrong moment how can he police the air? Don't need his a-tall.

6JE is on the job with his phone and takes up considerable ozone. However with all us sparks he's got about as much chance as a mothball in Salome's wardrobe. More power is the answer.

Frank was the first in the old days to hear Honolulu but when he gets that new invention calibrated he promises to keep us posted on the Yap question. Where is the Meteor Electric Company, Hi. Hi.

6XN, Senior, is so busy selling wireless apparatus that it was necessary to postpone his weekly tonsorial regatta. Nothing must interfere with business, however, bath or no bath.

NORTHWEST STATISTICS

After looking over my friends in the Northwest I see they are to have a big banquet and dance to be given by the Northwest Radio Association on June 25 at the East Side Business Men's Club Hall, at which all are cordially invited to attend. Mr. R. V. Russ, chairman of the banquet committee, requests that all persons wishing to attend notify him in advance so that he may order the required amount of stimulation, etc. The banquet is for ladies n everybody, he says. Exhibits of radio apparatus will be shown, and it is anticipated that a large number will attend from outside points. These men of the Northwest are not asleep by any means, and it does our heart good to see the N. R. A. blossom out so rapidly.

The N. R. A. is putting out a monthly paper called the "Hamograms," which is of a local nature. Mr. J. D. Falt (JW) is the most able editor.

The Northwestern Radio Association of Portland is turning out to be one of the live and wideawake clubs of the Coast. It is not a new organization, as it was started many years before the war, under the name of Northwestern Audion Association. During the war the club died out, but upon the raising of the ban upon amateur radio the club came to life under the new name.

Dr. H. A. Labby, a local dentist and radio enthusiast, is president of the club, and many rocks have been missed since he has been at the wheel.

One of the main activities of the club is the control of local sparks in such a way

(Continued on page 422)

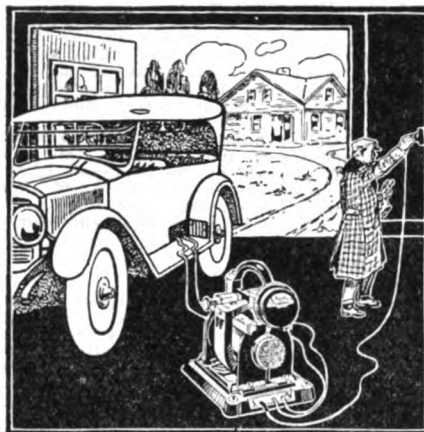
AMERICA LEADS THE WORLD COMMERCIALLY BECAUSE YANKEE INGENUITY IS PERMANENTLY ON GUARD

WHEN the world war in Europe began in August, 1914, and every cannon fired was sending the cost of living up all over the world, the American Look-Outs, Yankee Inventors, seeing their natural enemy, the cloud of increased costs rising on the horizon, cleared their decks for action and threw the clutch of their inventive genius into full speed ahead to dissipate that cloud, so as to at least in America maintain that high standard of living which has given to its citizens, both in their homes and industries, the so-called necessary conveniences and appliances, which we have come to look upon as common and natural, but which would have taken an active imagination for even the extravagant Caesar to wish for.

When that first S. O. S. of distress came in from a dentist whose cost of primary battery chemicals and renewals, which he was using to run his dental lathe, had jumped to \$1.00 an hour for current alone, which was prohibitive, the France Brothers, who were at that time building auto accessories, started assembling his means of attack and for \$35.00 built him their first

Storage Battery Charger or Battery Booster, which reduced his cost from \$1.00 to 10c an hour, by charging a Storage Battery from a Lamp Socket and forever doing away with his need for primary batteries, besides giving him a far more satisfactory service, and saving him 90 cents an hour in his operating cost.

These France Brothers then perfected this Storage Battery Charger, and their Full Wave, Automatic, Dependable and Economical product, which is now on the market under the name of the F-F Battery Booster, is reducing the cost of charging storage batteries to 10c from \$1.00 for thousands of Auto Owners, Wireless Operators, Experimenters and Storage Battery Users all over the world, and a single Battery Booster has been known to produce a profit of over \$600.00 for its owner, who used it to charge Storage Batteries commercially, which gives one an idea of their marvelous Durability and Economy of Operation.



The New Types in their perfected assemblages are complete with Ammeter and Battery Clips, everything mounted in one compact self-contained and portable unit, ready to screw its plug into a lamp socket, snap its clips on a Storage Battery and turn the switch, which automatically starts it charging, its Ammeter showing the amount of current owing.

No skill is required to operate, and the complete equipments are being sold at \$15.00

and up by The France Manufacturing Co. of Cleveland, Ohio, who mail complete descriptive literature free to all who write for it.

CALLS HEARD BY WESTERN AMATEURS

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

Calls Heard and Worked at 7BK, Seattle, April 15th to May 15th

Canadian 5BA 5CP 6AK 6CH 6DD (6DP) 6DY 6EX (6FH) (6HC) 6IY 6KK 6KL 6KM 6LC (6OC) 6OH 6OW 6PR (6QR) (6TC) 6TM (6TV) 6VM (6VX) 6WD 6AAN 6AAU 6AAW 6ABM 6ABX (6ACR) 6ADH 6AFV (6AGF) 6AID (6AIW) 6AJE 6ALA 6ANK 6APH 6ZA 6ZH 6ZN 6ZR 6ZU 6ZX 6ZAA (7BH) 7BQ 7BV (7CU) (7CW) (7DA) (7ED) (7FI) 7FQ 7GA 7GP 7HF 7HN 7IN 7JN (7JW) (7KB) 7KJ (7LS) (7MH) 7MY 7NL (7NN) 7YA 7YG (7YS) 7ZG 7ZI (7ZJ) 7ZK 7ZM. The above list includes only stations over 40 miles from Seattle.

Calls Heard by 6ANK, 818 F Street, Sparks, Nev.

6AAK 6AAR 6AAT 6AAW 6ABM 6ACG (6ACM) 6AD 6ADL (6ADQ) 6AE 6AFG 6AFN 6AH 6AID 6AIL (6AJR) 6AJV 6ALA 6ALI (6ARS) 6CH (6CP) 6DK 6DP 6EA 6EB 6ED 6EJ 6ED 6EX 6FH 6FI 6GP 6HC 6HH 6IG 6KA 6KL 6KM 6KP (6KS) 6LC 6MH 6NH 6OH 6OW 6PQ 6QA (6QR) 6RN 6TP 6VX 6XZ 6ZA 6ZH 6ZJ 6ZM 6ZN 6ZX 6ZY 6ZZ 7BC 7BP 7CC 7CW (7DA) 7FI 7KM 7IN 7YA 7ZJ.

Heard During May by 6SU
6ZA 6AJ 6AK 6AO 6DP 6EN 6EB 6FH 6GN 6GQ 6HC 6IC 6II 6IM 6LC 6MQ 6OW 6PQ 6RN 6SR 6TM 6WU 6ZB 6ZN 6ZU 6ZX 6ZZ 6ABM 6ABX 6ACR 6AEI 6AGF 6AGL 6AIW 6AJE 6AJW 6ANJ (cw and fone) 6APH 6CW 6DA 6FI 6MY 6TZJ.

Radio 6IQ, W. R. Hone, 323 North Brannick Street, Los Angeles, Cal.

Calls heard at my station during the last two months to May 24. Station marked worked have been worked in the last three or four days. Only those fairly QSA have been listed:

5IF 5ZA 5ZC 5ZJ 6AE 6AK 6CC (6DA) 6DP 6EX (6FB) 6FM 6HA 6HH (6IC) 6II (6IS) 6IV 6IY 6JR 6JT 6KF 6KL (6KM) (6MZ) 6NR 6OC 6OE (6PQ) 6QR 6QS 6RS 6RZ 6SB 6SK (6SR) 6TA (6TF) (6TL) 6TV 6VT 6WN 6XA 6XK 6XS 6XZ 6YA 6ZA 6ZB 6ZH 6ZJ 6ZK 6ZL 6ZM 6ZS (6ZU) 6ZX 6ZZ 6AAW (6AID) (6AGF) 6ACM 6BP 6BQ 6CU 6DA 6IN 6KM 6ZU 6ZJ. Anyone hearing 6IQ please QSL.

Calls Heard by 7JW, Portland, Ore.

5BA 5ZA (6AH) (6AN) (6CH) 6DD (6DP) 6LB (6FH) (6FM-cw) 6GP (6HP 6IE 6IS (6JR) 6JM (6LC) (6OC) (6OH) (6OW) (6PR) (6QR) (6SV) 6TV 6VA 6ZAA 6ZU (6ZX) 6AAT-cw) 6ABM 6AGF 6AJH 6A. A 6APH 6AD 6BA (7BK) 7BG 7EX (7FI) 7FQ (7NN) 7OF (7YA) 7ZG 9OE 9WU.

Calls Heard by 7MF, Eugene, Ore.

6OW 6ABM 6PR 6AK 6IY-cw 6DP 6EA 6EJ 6FH 6ZN 6DH 6DE 6BF 6KM 6TU 6DD 6IF 6FH 6EE 6DM 6ACM 6IJJ 6AFN 6APH (6AGF) 6QR 6AD 6AE 6BK 6BE 6BA 6DP 6DA 6GA 6BH 6IM 6BP 6EU 6EW 6EB 6EN 6NX 6NN 6MW 6FL 6FI 6ZG 6ZJ 6ZM 6LR 6PH 6Y 6YS 6QY 6ZH 6IY 6LU 6EL 6IF 6BA 6ZA 6LR 6XI-cw.

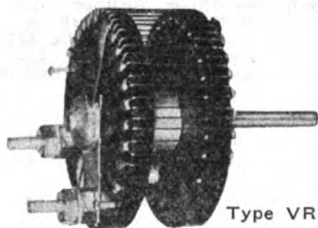
Stations Worked and Heard at 6RN, Pasadena, Cal.

5IF (5ZA) (6AE) 6AK 6AH 6AN 6CU 6CZ (6DD) 6DP (6FH) (6FI) (6HC) 6HH 6IC 6II 6IM 6IR 6IS 6JM 6JR 6JI 6KF 6KL 6KM (Continued on page 434)

NEW CHICAGO RADIO LABORATORY CATALOG

"Z-Nith Long Distance Radio Apparatus" is fully described in Bulletin F-21, recently issued by the Chicago Radio Laboratory of Chicago, Ill. The Bulletin is in the form of a complete catalog containing 48 pages. It is well illustrated with good half-tones and no amateur's library will be complete without a copy of this interesting Bulletin.

Cage Filament Rheostat



Type VR-1

An improved style of the Navy's cage rheostat. 6 Ohms. 1.5 Ampere normal capacity. Air cooled. Non-inductive. No hot metal contacts. Black Bakelite. Silver-plated brass. Very close adjustment. Panel mounting. For knob or 180 degrees dial. 1/4 in. or 3/16 in. shaft. Price \$1.50. Postpaid if your dealer cannot supply you.

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C. W. AND WIRELESS PHONE RECEPTION

Type V-1 \$5.50
Variometers

Type V-1 \$4.25
Variocouplers

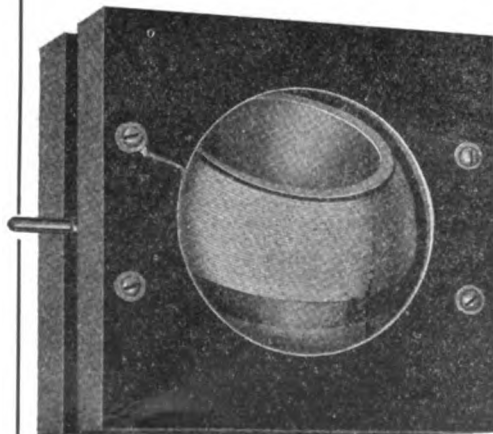
We pay all postage charges
DEALERS—WRITE US FOR PROPOSITION

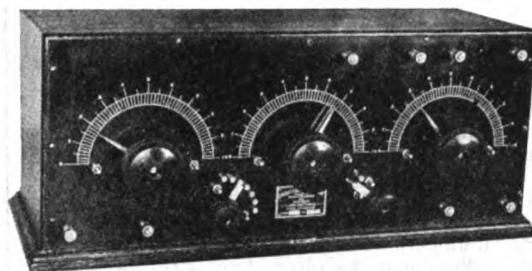
McGUIRE RADIO LABORATORY

Manufacturers of Radio Apparatus

1855 Church St.

San Francisco, Calif.





Z-NITH

REGENERATOR

The Most Perfect Regenerative Tuners

**Just Recently Developed to Function Perfectly
on Wavelengths from 180 to 1200 Meters**

THE man who buys the Z-Nith regenerator today knows beyond reasonable doubt that he stands at the threshold of a highly satisfactory experience.

Already he has enjoyed it in his own station; or at least he has observed its splendid operation elsewhere.

And now with its many new features, among which is the ability to tune to and function properly on wavelengths from 180 to 1200 meters, it is the most reliable and practical of regenerative tuners.

With the advent of CW came a demand for an instrument that would tune more sharply. And we have solved the problem. The new Z-Nith regenerator carries a variocoupler that is *variable thru 180 degrees* of coupling, not 90.

This wonderful new development has just doubled the accuracy of tuning. The tedious tuning of CW is no longer. There is not an instrument at any price that can compare with it.

This beautiful, highly developed Z-Nith regenerator is ready for immediate delivery at the reasonable price of \$55.00 f. o. b. Chicago.

Our new illustrated catalog upon request.

"Radio as you go"

**CHICAGO RADIO
LABORATORY**

*See it at the
First National A. R. R. L.
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Offices and Factory: 6433 Ravenswood Ave.

Testing Station 9zn-5525 Sheridan Rd.

Z-NITH PRODUCTS THE WORLD OVER

Manufacturers of the best radio apparatus made

Pacific Coast Radio Amateurs Wanted

THE U. S. S. "California" latest addition to Uncle Sam's fighting fleet, will go into commission shortly, manned by a full crew of Californians. There are several vacancies for California radio amateurs to act as operators on the new superdreadnaught. This is a good opportunity for a few of our best amateur operators and it will be of interest to

state that good ratings will be given to those who take advantage of the opportunity by enlisting at once. Ensign J. B. Dow, whose writings in "Pacific Radio News" appear from time to time, is Radio Officer of the new greyhound and he will be pleased to receive communications from California amateurs who desire to offer their services.

RADIO APPARATUS

*Distributors of Reliable Radio Apparatus to Schools, Colleges,
Radio Clubs and Experimenters All Over the World!*

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Every Continent! Why
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Over the World! Why
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No. UV-712 Radio Corporation, new type—Just out!\$ 7.00
No. 231-A General Radio, new type 5.00
No. 226-W Federal, mounted..... 7.00

AMPLIFIERS

No. RORK Grebe, two step, with automatic filament control.....\$55.00
No. RORD Grebe Detector and two step, with filament control..... 75.00
No. 215 General Radio, two step.... 50.00

AUDION CONTROL PANELS

No. RORH Grebe, in cabinet with tickler connection, splendid panel.....\$17.00
No. RORA Grebe, in cabinet with hinged cover, good value..... 12.50
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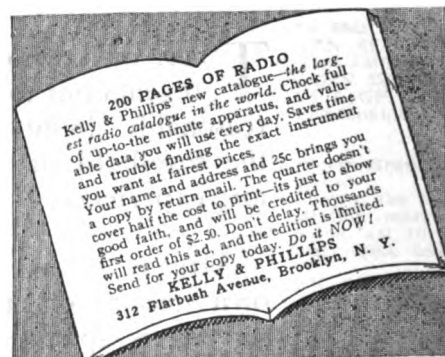
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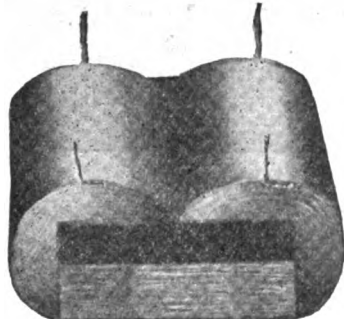
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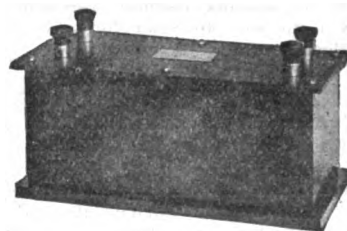
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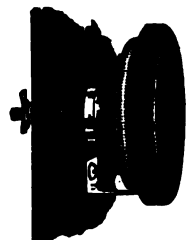
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PARKIN MANUFACTURING CO.
San Rafael, Cal.

SIX Stages of audio frequency amplification

See John Firth & Co.'s August advertisement

STATIC STATISTICS

(Continued from page 417)

that there will be a minimum amount of interference and no broad waves. The tuning committee, of which Mr. Austin (7XF ex 7Z1) is chief, has the job of visiting the different local stations with a wave meter and tuning them on 200 meters and with a decrement some place under 0.2.

NEW C. W. CATALOG

The complete line of CW transmitting and receiving apparatus manufactured by the Standard Radio Company of Los Angeles, Calif., is now ready for distribution. Those interested in busting through the summer static will do well to send for a copy of the catalog.

A SPECIAL OFFER

"Radio News," one year.....	\$2.00
"QST," one year.....	2.00
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Total\$6.00
Special combination price if all three are ordered together.....\$5.00
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LIEUT. FASSETT WITH MEYBERG CO.

Lieut. L. O. Fassett, U. S. N. R. F., one of San Francisco's oldest and best known radio men, will augment the sales department of the Leo J. Meyberg Company on July first.

THE GIRL AND THE PEARLS

(Continued from page 415)

company's inspector. It was he who spoke first.

"So you're going to play me for a sucker with your pearl game, eh?" he snarled, sarcastically. "Well, now we'll proceed to see who's the biggest sucker!"

He advanced to the table, opened the receiving cabinet, and took out the B-battery. Laying it on the floor, he got a hammer out of his kit and began to break it to pieces. Pulling apart the cells, he got out a jack-knife and cut one of them open.

There was absolutely nothing in it but carbon and filler! The next one was the same, and so were all the rest.

For a moment, Samuel Jones, himself, was amazed; then, in a flash, he realized that in changing the B-batteries, he had got them mixed up, and had put the same battery back in the cabinet he had taken out. Involuntarily, he glanced toward the locker, in which the other B-battery was lying. The customs men saw and immediately interpreted his glance. Opening the locker, they took out the spare battery. Breaking it into pieces, likewise, the company inspector cut open a cell, and there, in the bottom wrapped in a bit of tissue-paper, now ammoniac-soaked, were two large pearls.

"Well, that's all of them," said the shop man, ten minutes later, as he tore up the last cell; "forty-seven, altogether."

"That's about right," returned Merboler, smirkingly; "We understand there was six in a setting, and forty-one in a necklace, which makes—what the hell!"—the chief was picking up the pearls, and, as he did so, his face assumed an expression of amazement and disgust. "Pearls, you call them!" he sneered, staring at them, closely; "the damned things are light as feathers—they're fakes!" He pinched one, and it broke to pieces—a mere shell!

Everybody gaped in amazement.

Merboler's face was distorted by a mocking grin.

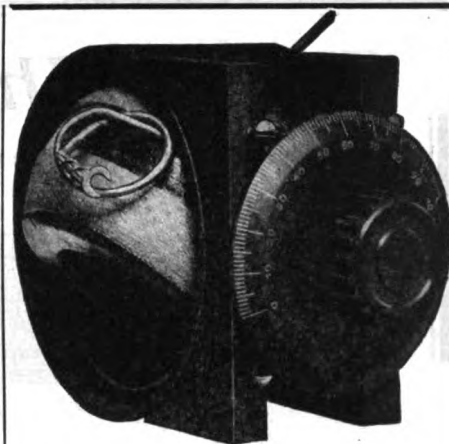
"Somebody's been double-crossed for fair, I'll say!" he chuckled, derisively. He threw the things onto the table, and they fell as lightly as a shower of popcorn.

"Sorry you had all that work for nothing, young man," said Merboler, tauntingly, to Samuel Jones, who sat looking extremely crestfallen; "take your pearls to Carter Jackson, with my compliments!"

When the "La Hermosa" had berthed at the Mail dock, and the passengers were all ashore, the chief radio operator, no longer in uniform, violently kicked a certain hulking cadet down the gangway. Once on the pier, the obstreperous brass-pounder set upon him, blacking his eyes and battering him unmercifully, before a half-a-dozen members of the crew could rush ashore to the rescue of the half-killed cadet.

"I'll eat my hat, if I can make head or tail of it," declared Cunningham to Samuel Jones, as the two threaded their way through the five o'clock crowds of homeward-hastening office folk; "the pearls turned out to be fakes, and you've half-murdered a poor, harmless cadet, and, judging by the way you talk, you're just as crazy as ever about that little squab who double-crossed you! What's the answer to all these riddles, anyway?"

"The answer is that you're all wrong about the girl, an' the pearls, an' the poor, harmless cadet," answered Samuel Jones, enjoying the other's mystification; "'an when I give you the dope you'll see why. You know I never was much doubtful of Lillian, but still I was afraid Merboler might get next some may to my havin' "

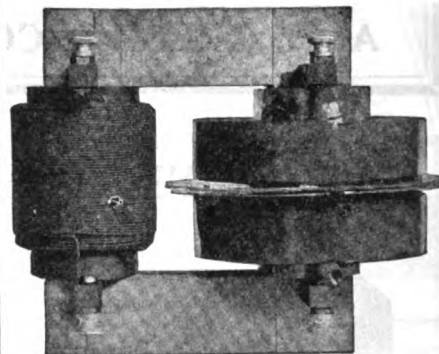


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob \$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps.

left the pearls behind last trip; an' so I figures out a swell scheme to make the whole game dead safe. I goes into a jewelry store an' buys forty-seven big artificial pearls; an', like you already know, those are what went into the bottom of the B-battery cells. I had it all planned out to send Merboler a anonymous letter, tippin' him off about the B-battery scheme, but the way it turned out, I got that done for me by the cadet—"

"By the cadet?"

"Yes. You see, when I took Lillian aboard the 'La Hermosa' last trip I see the cadet sneak in into the wheel-house, an' a little later in the wireless shack, I happens to discover that the whistle is out of my speakin' tube, which runs up to that same wheel house. The whistle was lyin' on the floor, an' when I picked it up, I sees that it'd not fell out a'tall, but had been yanked out—an', you know, if a fellow listens in on a speakin'-tube that's got no whistle blockin' it at the off-shore end, he can hear darned near everything that's said anywheres near it. Knowin' the cadet's in the wheel house, I sees through his little game right away; so I gives Lillian a spiel about the B-battery scheme—an' all the time I'm holdin' the tube right in my hand, so's the stool-pigeon will be sure to hear it. A little later, I takes the girl up to the wheel house, showin' her around an' soon's I get a chance, I drifts over an' gets hold of the radio room speakin' tube—an', sure enough, it's still warm, where the fellow's been holdin' it to his ear!"

"Then, besides that, I'd noticed a piece ripped out'a the coat tail of the sneak's shore clothes, which looked kind'a queer to me, someway. On the run south, I gets to thinkin' how the night out at Burlingame, Jackson had thought he'd heard somebody eavesdroppin' on us; an', pretty soon, just like the dick in the dime-novel, I gets the idea that the stool-pigeon might have ripped his coat scramblin' over the iron fence around Jackson's garden, which is high an' sharp-pointed, an' would be a darn mean one to climb. It all figures out pretty good; so I wires Jackson from Mazatlan to have his fence searched all around for a rag of blue serge. Sur as shootin' the night before we makes Frisco, I gets a wire from Jackson, sayin' he'd found it. Of course then I knows for sure the cadet is Merboler's stool pigeon.

"In quarantine, in the mornin', Merboler an, his gang comes rushin' aboard, an' as per the cadet's dope, digs right down into the B-batteries. Then, when they found the pearls was all floey, they just though somebody's cold-decked the deal down in Mexico. The idea tickles Merboler so much the damn fool never thinks to look around for any other pearls;—an' there I am sittin' with the whole works right in my pocket! Of course, I reckon the fake pearls bein' salted down so nice an' neat that way would've fooled even a brainy guy, not to speak of Merboler, who ain't got no more brains than the back end of a burro."

"So they goes ashore, an' the ship docks; an' I was feelin' so hell-fired happy I just chases that sneaky, yellow-livered stool-pigeon down onto the dock an' drums the daylight out'a him—I just couldn't help it, I felt so good!"

"Then I suppose Jackson has his pearls, at last?"

"You'd do more'n just suppose it, if you'd saw the check he gave me," returned Samuel Jones, exuberantly; "It's got four figures in it—an' the first figure's no small one, neither—an' oh boy!—this evenin' the little blonde baby an' I are going to charter a

(Continued on next page)

SORSINC

"The Largest "B" - Known"

To outward appearances "B" Batteries are generally similar; but when we tell you that the SORSINC is the largest 22½ volt unit—that the 15 cells are each 4 inches long and one and one-half inches in diameter—that the sealing compound permeates the entire unit—that it is moisture-proof—that it weighs 12 pounds—that it can be used for reception or transmission purposes and can deliver up to 50 milliamperes—that its capacity is 6400 milliampere hours—*THEN* you know that all "B" Batteries are not alike.

SEND POSTAL FOR FOLDER DESCRIBING THE SORSINC "B" BATTERY IN DETAIL.

Shelf life: Guaranteed not to depreciate more than 10% in voltage in 6 months.

\$4.00

F. O. B. our N. Y. or Branch Offices
Shipping Weight 14 lbs. Add P. P.

If your dealer cannot supply you, order direct from our nearest office.



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SHIP OWNERS RADIO SERVICE, Inc.

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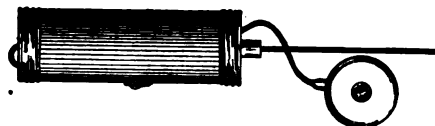
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Philadelphia—201 Parkway Bldg.
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Norfolk—26 Haddington Bldg.
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which enables you to detect instantly any knock, grind, loose parts or other trouble which causes destruction and heavy expense, unless attended to at once. Auto Mechanics everywhere depend upon the stethoscope for *inside information*. The mechanical stethoscope with authoritative *Sound Chart* offered to you on a *money back* guaranty for only

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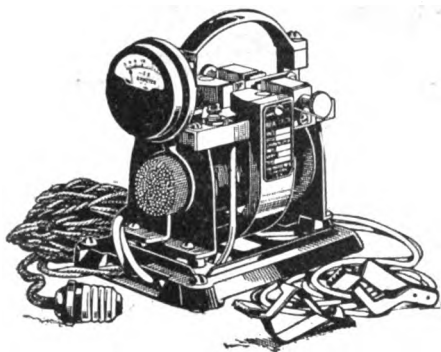
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SERVICE AT ANY LAMP SOCKET

Other F-F Battery Boosters charge batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. If not ready to order now, write today for Free Descriptive BOOSTER Bulletin No. 33.

BATTERY CHARGING STATIONS and GARAGES Use Our Large F-F ROTARY RECTIFIERS for Group Charging. Real Economy in first cost and in service. Charges up to 36 cells. Full Wave, Automatic, Dependable. Write today for Descriptive ROTARY Bulletin No. 33A, which gives full information, or mail Check with Order.

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10c CHARGES YOUR BATTERY AT HOME WITH AN F-F BATTERY BOOSTER

and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? A Storage Battery kept fully charged lasts longer and everything depending upon it works better, which is the secret of perfect battery service, and a Booster insures this. Do not run the risk of ruining an expensive battery, for it costs less to buy a BOOSTER than to be without one. The F-F Battery Booster is a Charging Apparatus, unfailing in its ability to deliver service day and night, is rugged and foolproof and requires no skill to operate. They charge automatically and operate unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. The Ammeter shows you just the amount of current flowing. Easily renewable and adjustable carbon electrodes rectify the current and last for thousands of hours. Everything is complete in one compact, self-contained unit. The F-F Battery Booster is a Magnetic Rectifier for 105-125 Volt 60 Cycle Alternating Current. Latest 1921 Models are:

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes	\$15
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Type 166 charges 6 Volt Battery, at 12 Amperes	\$32
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Type 112 charges 12 Volt Battery, at 6 Amperes	\$24
Type 1612 charges 12 Volt Battery, at 7 Amperes	\$32
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes	\$48

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights Complete with AMMETER and BATTERY CLIPS, 11 to 15 pounds. Order from your Dealer, or send check for prompt Express Shipment. If via Parcel Post have remittance include Postage and Insurance Charges, or have us ship C. O. D.

THE GIRL AND THE PEARLS

(Continued from page 423)
buzz wagon an' have one grand blow-out! Believe me, there's goin' to be a hot time in the ol' town tonight!"—and, parting with Cunningham at the corner, Samuel Jones turned his face toward "Leighman's Cafeteria."

PROGRESSIVE ACTIVITIES OF THE RADIO CORPORATION

(Continued from page 413)
carried it about in one's vest pocket, or kept it buried in the back yard! I had eight VT-2's given me six months ago, and they roosted under my bed—when not in use!!

These matters have, to a great extent, clarified and The Radio Corporation is the first in the amateur field with wonderful apparatus of all kinds—and suited to every purse (which is important news, to the average amateur!)

And it is of this apparatus that I would briefly tell.

I preface the body of this article by saying that at my own Special Station at Avalon, Catalina Island, California (6XAD ex 6BX) I have been using—among other tubes—three of the Radio Corporation's U. V. 202's for transmitting purposes, and I have had remarkable success. 6XAD has been reported as QSA from all the States adjoining California, and my signals have been very well received at Nampa, Idaho, by 7LN. The approximate distance from his station to mine is 1800 miles, and this transmission was accomplished on ICW, using 3-U. V. 202's, in parallel, deriving power from the 110 AC Avalon city current, through an especially-designed transformer and transmitter—both of which were built for my station, with the greatest of success, by The Western Radio Electric Company, of Los Angeles. The antenna current that I obtain is from 1.5-2 amps. And it should be noted that this work was done on my amateur-length antenna—NOT on the others, that I use for higher wave lengths! Transmission of 1800 miles on but three of the five Watt tubes is phenomenally good, and speaks volumes in itself for Radio Corporation products! Word—authentic—also reaches me that an amateur, on but one of these tubes, talked over 50 miles, any by daylight!

I am having another especial transmitter built by The Western Radio Company now; the power plant to go with it is being designed by F. W. Falck, of The Advance Electric Company, Los Angeles. On this new set I shall use the Corporation's U. V. 203's—the 50 Watt tube—and their U. V. 204's—the 250 Watt. If, with 3 U. V. 202's, I can reach 1800 miles—QSA—how far will 3 U. V. 204's carry my signals? Better put it t'other way about: how far will they not carry?

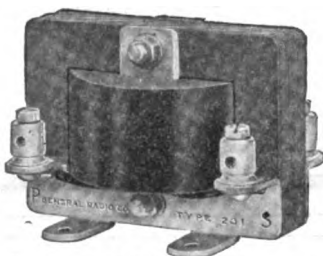
I also use, with eminent satisfaction for long distance work, the Corporation's U. V. 200 and 201. The former is an excellent detector, and the latter an amplifier that is extraordinarily efficient and simple of operation. These tubes I use on my Kennedy long-wave, regenerative receiver—an instrument, by the way, that is a sheer joy and continued DELIGHT! With but 1-step of amplification I read POZ without the slightest difficulty, and sometimes in full sunlight! Verbum sapientii!

There are three kinds of power tubes—so far—offered the amateur by The Radio Corporation: the U. V. 202—whose efficiency I have mentioned. The U. V. 203 and the U. V. 204. The latter is a new tube of great power, and of very long operative life, 250 Watt, and a remarkable oscillator. The former is a most successful tube, 50 Watt,

100% FROM YOUR TUBES

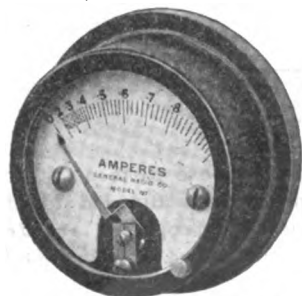
DESCRIPTION OF AMPLIFYING AND MODULATION TRANSFORMERS

Why did the editor of the "Pacific Radio News" devote editorial space to our new transformer in the June issue? Why have the Pacific Coast dealers been sending in telegraphic orders? Because our new Type 231 amplifying and modulation transformers are accurately designed electrical instruments. The new Type 231A amplifying transformer is the result of careful engineering design to produce a transformer which will give the maximum amplification of signals using a UV201 tube. The Type 231M modulation transformer is designed to give the maximum modulation possible without distortion when used with the UV202 tube. The design is right, the appearance is right and the price is right. Send for free bulletin 907C on the operation of amplifying and modulation transformers and completely describing our new Type 231 instruments.



Type 231

Price, Either Transformer, Completely Mounted, \$5.00



Type 127B

RADIATION AND FILAMENT AMMETER

Results are not obtained by guessing. They come from the intelligent application of accurate information. If you desire to get the best results from your CW set, it is necessary to make measurements of the various currents. Our Type 127 Hot Wire Ammeters are particularly suited for this service. They are suitable also for measuring the radiation currents of spark stations, and for measuring filament currents, either AC or DC. Supplied in a variety of ranges and for front or board, as illustrated, or flush mounting. Described, and ranges listed in Bulletin 904C.

Price, \$7.75

CARRIED IN STOCK BY LEADING RADIO DEALERS

GENERAL RADIO COMPANY

Massachusetts Avenue and Windsor Street,

Cambridge, 39

Massachusetts

whose price—\$30—puts it within the reach of practically every amateur's bank account. Trustworthy reports come to me that with 2 of the U. V. 203's, fine results have been attained from an amateur station on Long Island, N. Y.—to one in South Dakota! Very fine work—that!

And Mr. Bucher informs me that during the summer a still MORE powerful tube (!), to be known as the U. V. 206, will be placed on the market.

Using such apparatus as this it will be no trick at all to "work" across the United States—and even farther. I expect to be in touch with Honolulu—in that direction—and the Atlantic Coast, in the other, by the autumn!

It is an indubitable fact that CW and radiotelephony are the two methods of communication that are rapidly attaining unto the center of the radio stage. And to meet the hugely increasing demand for the necessary apparatus The General Electric Company is now manufacturing for The Radio Corporation a splendid list of CW devices and all manner of accessories—both for amateur work as well as for more advanced investigational and research effort. The Radio Corporation's range of apparatus is from power transformers—that will supply both high and low voltages to transmitting tubes, from 60 cycle, 110 V sources—to a newly-developed magnetic modulator, that will enable direct modulation of the antenna current of a tube transmission set. This latter device is one of the utmost simplicity, and is certain of finding instant favor in the eyes of amateurs, the nation over! For instance: with the Magnetic Modulator 2 of the 50 Watt, or two of the 5 Watt, tubes may be connected in a circuit for the production of oscillations, and their output directly modified by the new Modulator for telephony, without the necessity of a special modulating tube! The simplicity and the great advantages of this arrangement needs no dilating upon!

Furthermore: this autumn the Radio Corporation has intent to place on the market complete radio telegraph and telephone sets, of the vacuum tube type—ranging in antenna output from 200 Watts to 4 K. K. Some of these provide for CW, ICW and radiotelephony. Some are for telegraphy, alone—either CW or "tone". All these sets will be complete in every detail, and sold ready to install. Needless to add, they are all of the newest design, and incorporate the very latest word in vacuum tube construction and operation.

Various combination sets will be offered. On these, by the simple throwing of one switch, either of the three kinds of transmission that I have mentioned, will be instantly available. A special wave changer will be provided. In short: combined with the highest efficiency, the Corporation's manufactures will be of the utmost simplicity—a God-sent in itself!!

To my mind the set that will make a great deal of CW history is that which will be known as "the 200 Watt set"—employing 4 U. V. 203's for oscillation production. This set will not be so strenuously expensive but that a very large number of amateurs may own one. Going higher—the 1000 Watt set will use 4 U. V. 204's—each 250 Watts!

Satisfactory rectifying has ever been a bugbear to radio workers. Hence The Radio Corporation took up the matter and it now manufactures self-rectifying tube transmitters, giving an output of 2 KW!! These sets operate from a 50-60 AC. power supply, employing either a rectifying unit, or the magnetic method, for the plate current

(Continued on page 428)

A. R. Co.—first to offer the



NEW PACENT UNIVERSAL PLUG—\$2.00

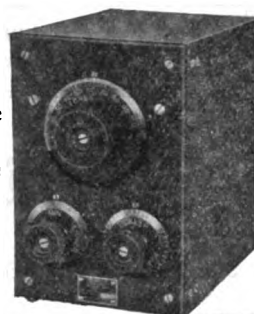
As usual, the Atlantic Radio Co.,—in touch with the latest developments,—is the first to offer for sale this improved plug. The Pacent Plug may be used to "plug in" a telephone headset, a microphone transmitter, a manipulating key, a loading inductance, etc., etc. In fact, its adaptability renders its name synonymous with its uses. Shipping weight 1 lb. Plentiful stock at both A. R. Co. Stores.

Mail Your Order To-day!

WESTINGHOUSE

RADIO RECEIVING APPARATUS

The high grade WESTINGHOUSE regenerative Tuner and Tube Detector Amplifier provide a most efficient set for code and phone reception over amateur and normal ship wave-length ranges.



Type RA
Short Wave
Tuner
Style 307189
180-700 Meters
Price
\$65.00

Tests conducted in our own laboratories lead us to recommend this equipment *unreservedly!* Its operation is simplicity itself,—its tuning exceptionally sharp,—its performance, day-in and day-out, remarkable. Literature gladly sent on request. As usual, A. R. Co. is among the first to have a complete stock and information about this new line.

ATLANTIC RADIO COMPANY

Incorporated

88 Broad Street
Boston 9, Mass.

Branch, 15 Temple Street
Portland, Maine

*Bulletin 14 sent on request to any reader
of the Pacific Radio News.*

BLUE PRINTS

OF ALL THE PRINCIPAL COMMERCIAL TRANSMITTERS

Kilbourne and Clark 500 cycle Transmitters, impulse type.

Marconi 240 and 500 cycle Transmitters.

Independent 500 cycle Transmitters.

Arc Ignition Key System.

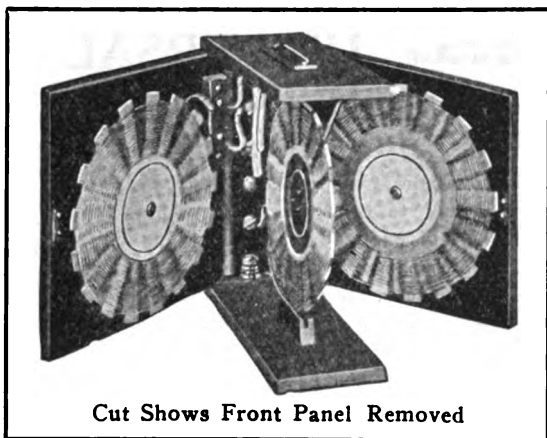
Splendid material for reference and home study.

\$2.00 A SET

PACIFIC RADIO SCHOOL ARC & SPARK SYSTEMS
433 CALL BUILDING SAN FRANCISCO, CAL.

Are you a Subscriber?

SPIDER WEBS-



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

are now manufactured on a large scale to have the price

REDUCED TO

lower than originally. A complete regenerative set, the equal of any, for only

\$5.50
Plus Postage

Distributed Exclusively in the West through

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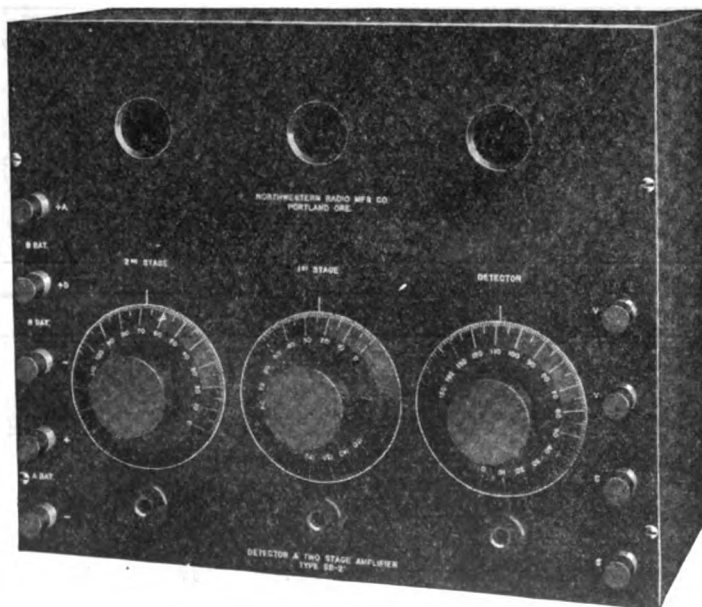
"Everything for the Amateur"

467 SO. FIRST STREET

SAN JOSE, CALIF.

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



Detector and two stage amplifier Type SR-2.
Size of panel $10\frac{1}{2} \times 12\frac{3}{4}$. Complete less tubes and battery \$70 f.o.b., Portland.

A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see and use this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

In writing to advertisers, please mention this Journal

CORWIN Improved Switch Lever

THIS month we are glad to announce the new Corwin Switch Lever,—a handsome, well-made accessory that will impart a high-class look to your apparatus. The knurled knob is identical with the knobs used on the standard No. 67 Corwin Dial. Brass shaft is moulded right into the knob, so that it can never work loose. Blade, bushings, etc., are nickel plated brass. Contact radius is $1\frac{3}{4}$ in. Price 40 cents, 5 cents postage.

Corwin's 1921 Catalogue

is being greeted eagerly by thousands of amateurs. Whether you ever ordered from Corwin or not send 10 cents for your copy of the 1921 catalogue. It's a good buy.

NEW RADISCO COUPLER—

The vario-coupler that's "accurate to the .002 part of an inch." Moulded base, Formica tube. Brass for all metal parts.
Price \$7.50, postpaid

UNIVERSAL-COIL MOUNTING PLUGS

Anyone can easily make smooth-running mountings with these plugs. Exceedingly accurate. Made to fit Radisco and all hand wound coils.

Price 80 cents, postpaid

VACUUM TUBES

Electron Relays\$6.00
VT Amplifier, (1 lb.) 7.00
VT Extra Hard for transmitting.... 7.50

VARIABLE CONDENSERS

A. R. Co. .001.....\$6.25
A. R. Co. .0005..... 5.00
With No. 67 Corwin Dial add \$1.00

GRID CONDENSERS

Radisco, Postage 3 cents.....35c

"B" BATTERIES

Radisco No. 1, 2 lbs.....\$1.50
Radisco No. 5, 5 lbs..... 2.65
Eveready Storage battery prices on application

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A.R. Co., 1 lb.....\$5.00
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Federal Closed Circuit 85c
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Postpaid

ALL RADISCO COILS and Wireless Press Books.

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Clapp-Eastham, No. 19.....\$1.00
Clapp-Eastham, No. 19A..... .85
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No. 66, 3"\$.75
No. 67, 3" with knob 1.30
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Murdock No. 55, 2000 ohm.....\$4.50
Murdock, No. 55, 3000 ohm..... 5.50
Brandes Superior 7.00
Baldwin C 16.50
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Brownlie, New 12.50

Shipping weight, 2 pounds

All orders for apparatus not listed as postpaid must be accompanied by postage charges.

A. H. CORWIN & COMPANY

Dept. C6. 4 West Park St., Newark, N. J.

CONTEMPTIBLE AND DANGEROUS WORK

(Continued from page 410)

police of one, and instantly reports all violations to the Inspector-in-Chief, the better for our amateur organization!

Without any authority so-to-do, I venture to say that Washington would be quick to appreciate such action on our part, as an outward and visible intent to obey the laws, and to see to it that others also—obey them!

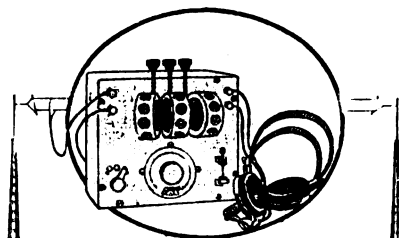
Let me say to you, gentlemen, that there is, today, in Washington, a very strong influence indeed, that is trying to take Radio supervision from the Department that now has such—and that is kindly disposed—placing said supervision and control in the hands of another department from which the amateur fraternity will not (!) receive the same consideration—no, not by the greatest stretch of the human imagination! Mind you, I am far from saying that, should this plan succeed—which God forbid!—amateur radio would go out of existence, but I most distinctly state that the present list of stations would be so ruthlessly cut—by severe examinations—that those surviving the "ordeal" would be but a comparatively pathetic few.

That this would practically kill amateur effort, is a foregone conclusion! And it is only the fact that, during the last war, amateurs did such effective work in the Government Radio Service—because of their knowledge gained by private communication, one with the other, experimenting, and so forth—that amateurs have the courteously-long "rope" that they now enjoy!

My pertinent query is: WHY HANG OURSELVES WITH IT?

Solemnly I say to you all that unless you keep on your allotted wave lengths; unless this forging of correspondence and calls, the illegal use of power, etc., are all put an end to, there is very serious trouble for all amateurs hanging in the wind!

Be wise and—take heed!



Put up a complete radio station in two hours

AN ABC UNIT receives wireless telephone, telegraph, time signals, Government market reports, news items, etc.

Simple to operate—just turn one dial. No batteries, license or radio experience needed. Guaranteed by leading radio manufacturers.

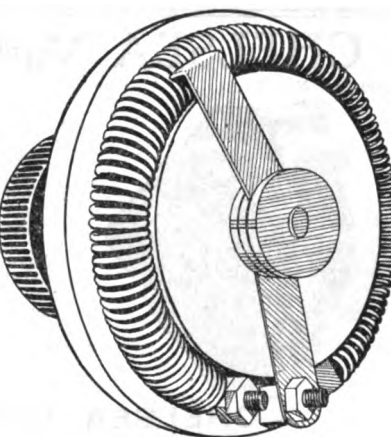
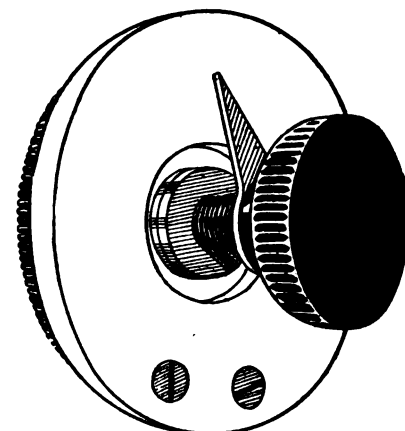
Price, \$24.50. Phone, aerial, all equipment to complete station included in "ABC" Complete Package for \$75.00

Our 16-page booklet, "How I Put Up a Complete Radio Station in 2 Hours," is the actual story of a young man with no experience or wireless experience whatsoever! Send 10 cents for Booklet #7

Wireless Equipment Co. Inc.
Newark, New Jersey



SHRAMCO -REO-



For your power tube—

New type Shramco Reo, No. 90P.

1.5 ohm Nichrome resistance.

Current capacity 6 amperes.

Price \$2.00, 1 lb. postage.

ABACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2 1/2 in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt Detector

and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price, \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2 1/2 in. base.

SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K." listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

233 Broadway, New York City
525 Market St., San Francisco, Cal.

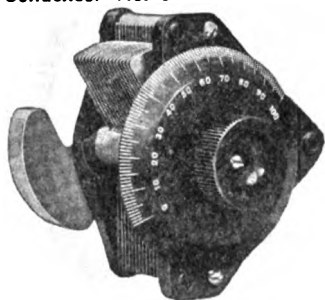
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411 S. Main St., Los Angeles, Cal.

1710 Royal Bank Bldg.,
Cor. King and Yonge Sts., Toronto, Ontario, Canada

CHELSEA Variable Condensers

Condenser No. 3

(Die-Cast Type)



No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/4 x 3 1/4	1 1/4	\$5.00
2	.0006 m. f.	Mounted	4 1/4 x 4 1/4 x 2 3/4	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/4	1 1/4	4.25
4	.0006 m. f.	Without Dial	4 1/4 x 3 x 3 1/4	1 1/4	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

PROGRESSIVE ACTIVITIES OF THE RADIO CORPORATION OF AMERICA

(Continued from page 425)

source—which is energized directly from an AC supply, at 10,000 volts.

The General Electric Company is also at work, developing for The Radio Corporation, other tube telegraph transmitters, giving antenna outputs up to 4 KW—the plate circuits of which are fed from a rectified AC supply at high voltages using the new General Electric kenotron rectifier valves.

From this cursory article it will be seen that The Radio Corporation intends to specialize in CW apparatus of every kind. So progressive a spirit is certain of meeting with the enthusiastic appreciation of amateurs—the seriously-minded operators—all over the United States, and the Sales Division of the Corporation, at 233 Broadway, New York City, notify me that they will be very glad indeed to answer inquiries with regard their manufactures. The Corporation's engineers stand ready to advise with prospective customers—or with them that have already acquired R. C. apparatus—and to supply them with all data and information having to do with tube sets in order to obtain the best results from them. Inquiries should be addressed to the offices of the General Electric Company throughout the United States and in other lands.

From a purely personal point of view, I should like to publicly express my appreciation to Mr. E. E. Bucher, the Commercial Engineer of The Radio Corporation, for his great assistance and courtesy to me in matters having to do with my station—that utilizes Corporation products extensively—and most satisfactorily. I also desire to thank Mr. W. O. Batchelder, the manager of The General Electric Company's offices at Chicago. The assistance of both of these gentlemen has been invaluable.

VOLTAGE AMPLIFIERS

(Continued from page 406)

ably provided with its own filament and plate batteries although I believe that if the proper radio frequency chokes were inserted in both filament and plate circuits, that the oscillator would be operated from the amplifier batteries. The reader should try this for himself and see what can be done along this line. Personally I have never had time to actually try this arrangement.

The above mentioned arrangement using a local oscillator for converting all incoming signals to a definite wave length should prove very valuable for relay work especially in connection with a device to be described in the next article whereby the signals can be printed on a Morse recorder.

The reader may wonder how he is to know how to set his local oscillator so as to get a resulting wave length of say 3000 meters. Proceed as follows: Get a wave length frequency table. Look up the frequency corresponding to 3000 meters and to the wave length of the incoming signals of say 200 meters. Add or subtract the 3000 meter frequency from the incoming frequency and either value will give you an oscillator setting which will produce a 3000 meter wave length; choose the most convenient one. The oscillator should be calibrated with a good wave meter and then it is a very simple matter to make the necessary adjustments.

GET THE BIG FIGHT! WESTINGHOUSE RADIO RECEIVING EQUIPMENT

The high grade Westinghouse regenerative tuner and tube detector amplifier embody the latest ideas of two of the foremost radio engineers, Edwin H. Armstrong and Frank Conrad. This apparatus provides a most efficient set for Telegraph and Telephone reception over the amateur and normal ship wave length ranges. Both units have been severely tested, proving conclusively the manufacturer's claims—exceptional sharpness, simplicity in design and operation and high efficiency.

PRICES
Type RA, Style 307189 Shortwave Regenerative Tuner—\$65.00.
Type DA, Style 307190 Detector-Amplifier—\$65.00.

Type RC, Style 307215 Shortwave Tuner, Detector and Two Stage Amplifier Combined in One Cabinet—\$125.00. (Order by style number.)

A stamp will bring the new Westinghouse Folder No. 4446—"Radio in a New Role"—a most interesting booklet about Westinghouse radio equipment.

Dealers:
CALIFORNIA ELECTRICAL CONSTRUCTION CO.,
320 12th St., Oakland, Calif.
HERROLD LABORATORIES
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LEO. J. MEYBERG CO.

(Successors to Haller-Cunningham Electric Co.)
Distributors

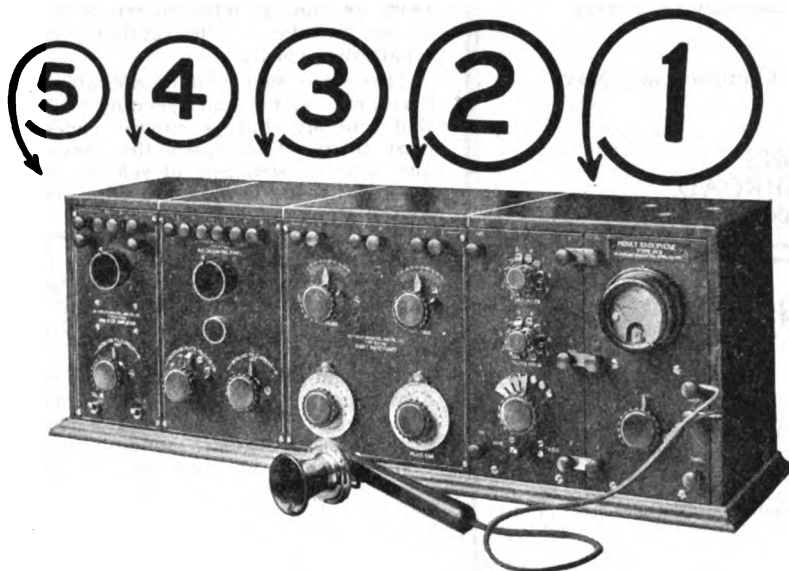
428 MARKET STREET

SAN FRANCISCO

Experimental Station 6XG, Fairmont Hotel
Dealers, Write for the Westinghouse Proposition

You Should Be A Subscriber

If It's A Radiophone It's A DeForest Invention
A New Idea In Radio—A C.W. Design



RADIOPHONE "INTERPANEL" SYSTEM

*For Commercial and Amateur Telephone
and Telegraph Service*

The "Interpanel" System marks an advance in radio apparatus design equal in importance to C.W. for transmission.

The "Interpanel" System has all the convenience and expandability of sectional book cases.

Each panel is only 9 inches high. Each panel mounts a *complete* apparatus. Each panel gives a minimum amount of space to the apparatus. Each panel gives all the space the apparatus requires. The panels lend themselves to stacking in any position and in any direction.

Two panels make a complete listening station.

The panels may be added one by one to increase the range of your station.

Complete set of four units mounted vertically.

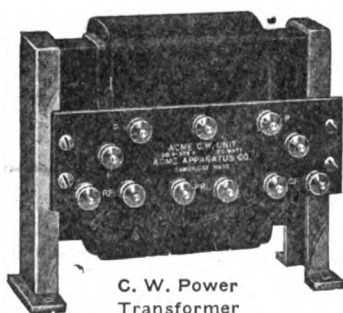
- (1) Complete radio "midget" transmitter. Phone sending range 30 miles (OT-3).
- (2) Complete short wave tuner, 150 to 600 metres (MT-100).
- (3) Complete audion control, especially for standard gaseous tubes (MP-100).
- (4) Complete one-step amplifier (MP-200).
- (5) Any additional step of amplification may be added.

Get the "Interpanel" Idea. Send for Catalogue 78

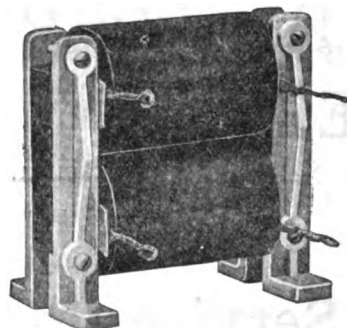
De Forest Radio Tel. & Tel. Co., 1415 Sedgwick Ave., New York City

Inventors, Licensors, and Manufacturers of Highest Grade Radio Apparatus.

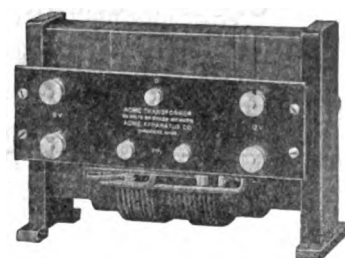
ACME C. W. APPARATUS



C. W. Power
Transformer



1 1/2 Henry Choke Coil



Filament Heating
Transformer

C. W. Power Transformers

For use with rectifying devices or for A.C. directly on the plates of power tubes.

SPECIFICATIONS 110 volts 60 cycles				
Output	Filament voltage	Filament current	Plate voltage	Plate current
50	10	2.5	350	100
	Two filament windings			
200	12	5	250-550	200
	Two filament windings			
500	0	0	1000-1500	400
	No filament windings			

The Apparatus with a Guarantee.

1 1/2 Henry Choke Coils

For use in ironing out pulsations and for modulating single and double 150 MA and 500 MA capacity.

Filament Heating Transformers

Allow the use of A.C. for power tube filament heating.

Specifications 110 volts 60 cycles		
Output	Secondary voltage	Secondary current
75	8-10	7
150	10-12	13

Modulation Transformers

Give maximum modulation without distortion.

Your dealer will be glad to show you these Ask for bulletins

ACME APPARATUS CO.

Transformer and Radio Engineers and Manufacturers.

**182 MASSACHUSETTS AVE.
CAMBRIDGE 39, MASS.**

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"The Radio Telegrapher"

Official Organ
UNITED RADIO TELEGRAPHERS' ASSOCIATION

Room 303
24-26 Stone Street

Read about what's going on among the Commercial, Navy and Army operators

ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 yearly, 15 cents a copy

Tresco Ten \$ Tuners

When you think of tuners say TRESKO.
One for every need and wave length.

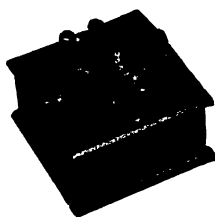
Presume you would like to hear something of the luck I have had with your "TRESKO tuner", which I bought of you some time ago. I am more than pleased with it. If I could not get another, I wouldn't take a hundred dollars for it, and it is certainly the best tuner I have ever used. All stations of from 4,000 to 20,000 meters come in loud and strong, and without amplifier. Another feature is, that it will work right through static, with a little adjustment. Since owning this Tuner, I haven't "closed up" on account of static.

J. B. ELLIS, Rancho De Casa Loma, Cochise, Arizona.

CATALOG FREE

TRESKO,

Davenport, Iowa



TRANSFORMERS

The new "Puget" transformer is now ready. Don't be misled by ads for low voltage transformers. The "Puget" is resonant and puts the most energy into your condenser. The ½ K.W. far outclasses 1 K.W.'s of other makes.

500 Watt Size.....\$26.75
25,000 volts

GIVES A CLEAR NOTE ON AMRAD GAPS

AMPLIFIERS

1 Step Panel, \$18.00; 1 Step in Cabinet, \$22.00; 2-step in cabinet, \$45.00. Full line of Amrad, DeForest, Radisco, Murdock, Etc.

Fast Mail Order Service

Northwest Radio Service Co.

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SEATTLE, WASH.



--RADIO INSTITUTE-- OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

335 New Call Bld., San Francisco

When writing to Advertisers please mention this Magazine

DO YOU KNOW THE CODE?

(Continued from page 405)

so forth. Therefore, space your letters evenly, and leave word spaces about twice as long as letter intervals so there is no mistake at the receiving end in separating words.

There are many radio operators who have gone on for years sending so poorly that nobody but a mind reader can copy them. The reason they never find out they are deficient in sending is that none of their friends are kind enough to tell them so. Are we so proud and such "bad losers" that we are not game to hear someone tell us our faults? We ought to be men enough to take our friends' advice and see, after all, if we are not faulty, and then correct the fault as quickly as possible.

By sending RIGHT an operator is distinguished. A good sending operator flatters the receiving operator because good, clear, regular, sending is more easily readable at high speeds, and the receiving operator can really copy at a greater rate than with a poor man at the key.

"A poor workman blames his tools," but how about, "A good workman always keeps sharp tools." The latter applies to our sending keys. They must be right. The trunnions or pivot bearings of keys should be adjusted with no play at all, and yet loose enough so the key lever will drop (without the spring) onto the contact from its own weight. Springs should be just tight enough to return the key lever to its up position quickly, and most certainly should not be tight so that an operator has to use more than a very light pressure to depress the key. Why use heavy muscular force to send, when sending without a single error for an hour steady should not consume any great amount of energy? Muscular force is not needed so much as rythmical even, clean-cut applications of light muscle action. The wrist should NOT do the sending. The dots and dashes should be made with the forearm, the elbow resting on the table in a comfortable position. Your key must be far enough back on the table so this can be done. Keep your wrist loose, using it as sort of a shock absorber or refiner for the more or less rough impulses coming from the forearm.

With a steady, earnest, plugging away at this art of sending, a little practice each day, with good advice to be had, and always holding down on the speed, a poor operator can develop into a remarkably good one.

Let's all KNOW THE CODE!

MULTIPLE TUNED ANTENNA

(Continued from page 409)

For medium-powered tube sets these oscillating lead inductances can consist of helices of bare copper wire, about No. 12 gauge, about six inches in diameter. By the use of clips the inductance can be adjusted as closely as necessary. Where they are placed outside of the building they can be protected from the elements by a suitable water-tight housing. Tuning the system to a desired wavelength will be found to be a rather awkward procedure at first, but once tuned, any slight falling off in total antenna currents can be corrected sufficiently by slight readjustment of the oscillating timer and the radio frequency amplifier coupling.

AN APPRECIATION OF LIEUT. STONE'S LITERARY CONTRIBUTION

(Continued from page 410)

set his feet on the upward trail of radio—the trail that eventually leads to success!

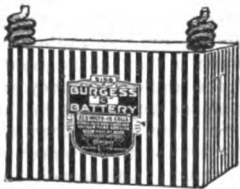
The author has so clear and terse a way of placing things before his readers that the veriest tyro may easily grasp the matters under discussion, to his profit. And yet he who is well along the radio way will find much that is of great value in the 400 pages. Lieutenant Stone has a lucidity of style that is near-phenomenal in a scientific writer—making it a decided pleasure to read him—rather than a "grind." His work has all the qualities of that of an expert, and none of the cumbersome verbiage that is found in the average technical volume.

Chapters 2, 5, 7, 9, 10 and 11 are of extreme interest, and the student of radio who thoroughly digests their contents will have a goodly store of practical knowledge tucked away for effective use.

In heavy type, most appropriately bound, with well executed drawings of various hook-ups, and apparatus of many kinds, "Elements of Radiotelegraphy" is a most decided acquisition to the library of the earnest worker in the vast field of radio development.

SIX Stages of audio frequency amplification

See John Firth & Co.'s August advertisement



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ARE THE NOISELESS KIND—made with and without taps

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LOS ANGELES, CAL.

THIS WONDERFUL DETECTOR

BOYS!!!

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Including Postage

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New York, N. Y.

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Enclosed is.....for which please send me

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.....Iron Pyrites DetectorCarborundum Detector

Name..... Address.....

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Published every month. It keeps you posted on important meetings.

United Radio Telegraphers' Association, Pacific Coast Division—Rooms 418-420, 24 California St., San Francisco Cal. Phone Douglas 706. All commercial operators eligible for membership. Address communications to above address.

San Francisco Radio Club, Inc., S. F. Gymnastic Club, Sutter and Divisadero Sts. San Francisco, Calif. Meetings every Thursday evening at 8:30 P. M. Visitors welcome at any meeting except first meeting of the month. Initiation fee \$2.50. Monthly dues 50c. For experimental and commercial radio operators, address communications to the secretary. —adv.

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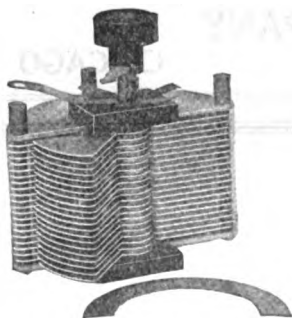
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150 Nassau Street

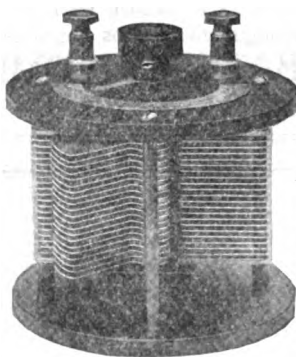
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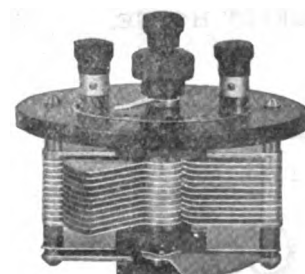


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Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



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With Style No. 1, we will, if desired, furnish 3 inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial.

Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave., Springfield, Illinois

THE MAGNETIC AMPLIFIER

(Continued from page 407)

effect from the selected exciting current. If telephonic control of the arc output is desired, the exciting current will be limited by the method of modulation, and by attenuation of the radio-frequency wave resulting from the impedance of the control winding. If key control is desired, this exciting current may be made any value convenient to handle. Regardless of the value of this current, the ampere turns in the exciting, or control winding, should be equal to the ampere turns in the radio-frequency winding to produce maximum control with efficiency, and the total resultant ampere turns at the amplitude of a radio-frequency oscillation must be sufficient to bring the operating conditions of the iron well up on the flat part of the magnetization curve for the particular iron, in order that its permeability will be a minimum.

The magnetic effects of control and controlled current may be superimposed, and a curve representing the upper magnetizing characteristic may be obtained as a resultant (Fig. 7). This characteristic shows the importance of the proper relation between control current ampere turns, and ampere turns in the radio-frequency winding. If the latter be excessive, a reversal of the magnetization in the iron will be produced and control will be unstable for the portion of the oscillation producing the reversal. In addition control will not be a maximum because of the preponderance of magnetization from the radio-frequency current.

Another factor to be considered here is the effect of mutual inductance between the radio-frequency winding and the control winding. Disaster to the control winding is almost certain to result from any great amount of mutual inductance. There are two simple methods of eliminating this. The first one, and the one that we shall consider here, is to wind the turns composing the two windings at right angles, and the second one, which was used by Alexanderson, is to loop the magnetic circuit included by the radio-frequency winding in such a way as to neutralize the effects of the radio-frequency current.

It was stated heretofore in this article that the permeability of a given sample of iron is unaffected by the frequency of alternating magnetism. However, owing to the multitude of eddy currents in iron which is under the influence of a high frequency current, apparent permeability, rather than actual permeability, must be considered in problems of design. Wherever eddy currents exist, secondary magneto-motive-forces exist. And with increasing frequency at constant impressed magneto-motive-force, the resultant magneto-motive-force decreases, due to the increases of the demagnetizing secondary, or eddy currents. An attenuation of the resultant magneto-motive-force takes place, which increases with depth below the surface of the iron owing to the summation of the effects of the demagnetizing eddy currents—which results in the so-called "skin effects at high frequencies." This lack of uniform magnetization results in an apparent change in permeability.

The effective penetration of the alternating magnetism into the iron, or the thickness, t , of a surface layer which at constant induction, B , would give the same total magnetic flux as exists in the iron; or in the case of a laminated core, in a lamination, is:

$$t = \frac{1}{(1-j)C}$$

or, in absolute value,

$$t = \frac{1}{C \sqrt{2}}$$

The apparent permeability, r' , is:

$$r' = \frac{CT\sqrt{2}}{2r}$$

$$\text{hence, } r' = \frac{aT\sqrt{2}f}{2r}$$

where,

T = thickness of a lamination.

f = frequency.

λ = conductivity in micohm cm.

r = permeability.

$C = a \sqrt{f}$.

$a^2 = 0.4 \Pi^2 \lambda r 10^{-2}$

For a derivation of these formulae, the reader is referred to "Transient Electric Phenomena and Oscillations", Steinmetz.

Assuming that number 29 guage "Apollo" Special Electrical High Silicon Alloy, as manufactured by the American Sheet and Tinplate Co., is selected for this apparatus, we can proceed in detail with the problem. This material has a conductance of approximately 50 micohm centimeters and a thickness of 14 mils. By referring to the magnetization curve, Fig. 1, it will be seen that at the small value of field intensity $H=1$ the permeability,

$$r = \frac{B}{H} = 3500$$

$$\text{at } H = 180, r = \frac{B}{H} = 120$$

$$\text{and at } H = 360, r = \frac{B}{H} = 62$$

Substituting these values of r in

$$a^2 = 0.4 \Pi^2 \lambda r 10^{-2}$$

$$a = 1.66 \text{ for } r = 3500$$

$$a = 0.307 \text{ for } r = 120$$

$$a = 0.22 \text{ for } r = 62$$

Continuing the substitution in

$$r' = \frac{aT\sqrt{2}f}{2r}$$

$$r'_1 = 475$$

$$r'_2 = 90$$

$$r'_3 = 63$$

These are the values of apparent permeability at a frequency of 30,000 cycles per second.

The maximum field intensity obtainable from the effects of the control current of 1.2 ampere is 180, and inasmuch as the ampere turns in the radio frequency winding are equal in number to those in the control winding, the value of field intensity, 180, is doubled when the amplitude of a radio frequency oscillation is reached on the positive side of the cycle. At this point, the apparent permeability of the iron is reduced to 63 as found above.

(To be continued)

THE FAIRMONT STATION

(Continued from page 411)

upon at this particular station. The filter system consists of two 21 AA Western Electric, one mf condenser and two Acme choke coils.

For the information of those desiring to build a set of this kind, the following points will be of value:

When starting up the set, tubes should be lighted to proper brilliancy and a plate potential of about 350 volts applied. This

will give you an approximate reading of 75 milliamperes on the plate meter. Then adjust the two inductance switches and tuning condenser; also grid leak, until maximum radiation is obtained. All of these adjustments are fairly critical. After set is radiating the plate potential can be increased until the plates of the tubes glow red. The tuning condenser should not be adjusted too critical for maximum radiation, for if the set stops radiating an excessive amount of current can be applied to plates and might burn out the tubes. Three dry cells are found to give best results in connection with the modulation transformer, Magnavox and Western Electric transmitters. The clarity of the three dry cells used with the above should be tested for best modulation.

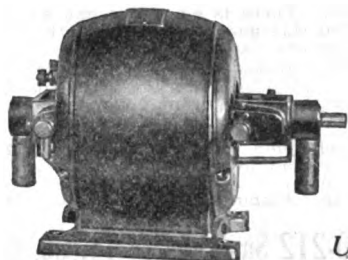
Wiring Diagram of 6XG

Many requests have been received for a wiring diagram of the Fairmont phone transmitter, as well as other constructional details of the set. For this reason we are going to give you the complete wiring diagram in the next issue of "Pacific Radio News."

A 6 Volt Battery will Operate a CW Transmitter

when used with a

RAY-DI-CO "DYNAMOTOR"



Ray-Di-Co. "DYNAMOTOR" operates on 6 volts, delivering 400 volts for space current.

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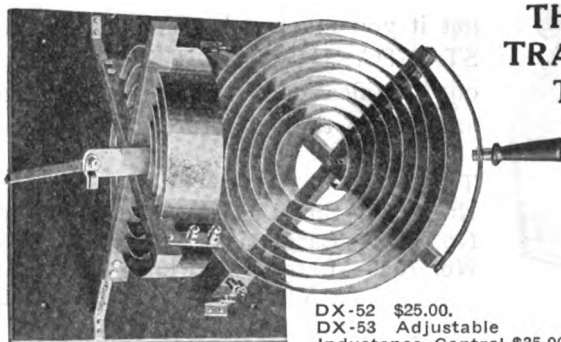
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DX-52 \$25.00.
DX-53 Adjustable Inductance Control \$35.00.

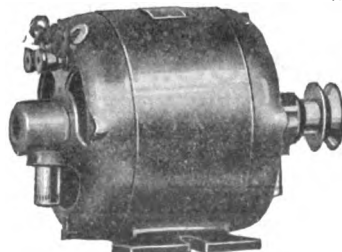
SYNCHRONOUS MOTORS

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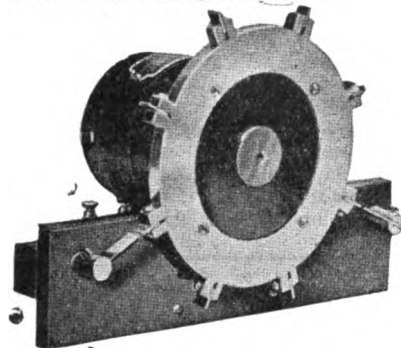


Add \$3.50 to list for 25 cycle motors. Prices are F. O. B.



DUCK'S New Big-200 Page No. 14 Wireless Catalog 21 and 27

Mailed for 12c, either in stamps or coin, which amount you are privileged to deduct on your first order of \$1.00. Catalog positively not sent otherwise. This edition of our wireless catalog is the most complete and elaborate we have ever put out. It embraces everything in wireless worth while. As an encyclopedia of information it is invaluable. It is printed on excellent paper with a beautiful cover. Your amateur friend will tell you that there never has been any wireless catalog to take the place of Duck's, and above all, that you can absolutely rely on the quality of every instrument listed in this catalog. In a word it is all worth while catalogs in one.



Improved Type Sayville Rotary Gap

Embodies the latest and best features in Spark Gap Construction.

Our New Type Sayville Rotary Gap is, we believe, far in advance of any rotary gap on the market within a range even of twice the price. It is the final development of many different types made in our experimental Radio laboratory. It fulfills every requirement of the ideal rotary gap. It is neat and attractive in appearance; simple and durable in construction; possesses a wonderful motor; has a cast aluminum rotary wheel, beautifully polished; every part is in perfect alignment; there is no wobbling of the motor; produces and maintains a clear and pure 500-cycle note; is instantaneous in action; permits of no dragging of the spark;

has contacts of tempered flat copper of proper length and width, easily and quickly removable, and inexpensively renewable; the stationary contacts are adjustable to any length.

The picture above really does not do it justice. There is no rotary gap we have ever sold that we consider in the same class with this gap, and we have therefore, discontinued the sale of all other types listed in our catalog.

Any purchaser is privileged to return it within three days if it does not come up to all the high claims we make for it. A first-class Rotary Gap is the very heart of an efficient transmitting set, and we cannot too strongly emphasize care in the selection of this instrument if effective and dependable results are desired.

No. A1798—Improved Type Sayville Rotary Gap (shipping weight 9 lbs.).....\$27.50
Renewable Rotary Electrodes (not less than five sold), each..... .05
Renewable Stationary Electrodes, each..... .10
Type A Motor as supplied with above gap (shipping weight 6 lbs.)..... 15.00

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Variable	3.50

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THE BEST HONEYCOMB COILS AT THE LOWEST PRICE. Many satisfied customers are using them. Immediate delivery on the following sizes: 25 turns, 45c; 35 turns, 45c; 50 turns, 55c; 75 turns, 60c; 100 turns, 65c; 150 turns, 70c; 200 turns, 75c; 250 turns, 80c; 300 turns, 85c; 400 turns, 90c. Postage extra. Superior Coil Co., 1831 Balboa St., San Francisco, Cal.

EDISON BATTERY, 6 Volt 40 ampere-hour, \$30.00. Ideal for radio work. W. S. LEVIN, 709 Larkin St., San Francisco.

DANDY Audion set for sale, and other radio material cheap. F. HALL, 211 Edgewood Ave. (Sunset District), San Francisco

RADIOTRONS, \$4.25; Paragon Rheostats, \$1.25; Sockets, 80c; Murdock Variables, 0.001, \$3.75; Honeycomb Coils; Grid Condensers; B Batteries; Amplifying Transformer, \$5.75. JIM CALDWELL, 480 Pine St., San Francisco.

TWO brand new A. P. Amplifier Oscillator Tubes, regular price \$7.00 each, sell both for \$12.00. RADIO, 251 Duboce Ave., San Francisco.

BI-LATTICE COILS (Duo-Lateral). For long distance reception this is the best type of inductance. **SINGLE LAYER COILS.** For short wave reception a set of these coils compares favorably with the best regeneratives; and the cost is but a fraction of the regular regenerative set. Send 3c for bulletin. Our prices will surprise you. P. J. STOCKWELL, Box 157-D, Reading, Mass.

NEW set Hawkins Guides, \$8.00 postpaid. WM. BOWERMAN, Redding, Cal.

FOR SALE—Account of going into the CW line, will sell half kilowatt transmitter described in March "Pacific Radio News" for less than cost of material. If interested, write to O. SCHUWENDT, 1046 Blackstone Ave., Fresno, Cal.

FOR SALE—Murdock oscillation transformer, \$3.50; four sections Murdock transmitting condenser, \$2 section; all for \$10. H. J. MCCOY, Jr., 1305 Arch St., Berkeley, Cal.

VARIOCOUPERS, wound on bakelite tubes, \$5.25; variometers, inside windings, \$4.25; complete for panel mounting; also carry all parts for above units. Magnet wire, DCC, No. 24, 1/4 lb., 40c; No. 26, DCC, 50c, 1/4 lb. Other sizes in proportion. MEADE BAKELITE AND RADIO APPARATUS, 522 Central Ave., Brooklyn, N. Y.

CALLS HEARD

(Continued from page 418)

6LR 6MZ 6NQ 6OC 6OH 6OT (6OW) (6PR) (6QF) (6QR) 6QY (6RT) (6SK) 6SR 6TC 6TV 6VM 6VW 6VX 6WZ 6XZ 6ZA 6ZB-cw 6ZH (6ZR) (6ZU) (6ZX) (6ZY) 6ZZ (6AAK) 6AAT 6AAU 6AAW 6ABH 6ABM 6ABX 6ACM 6ACR 6ADA 6AFN 6AGF (6AID) (6AIK) 6AIW 6AJE 6AJT 6AJX 6AKH 6ALA 6AOY-cw (6APH) (6XAD-cw) (7BH) 7CU 7DA 7YA. Anybody hearing me please QSL. All will be answered. 6RN reported QSA at 9YW, Rapid City, S. D.

6AKW, Fullerton, Cal., for Month of May 6ZR 6ZU 6ZX 6ZZ 6ZN 6XA 6XAD-cw 6OH 6OW 6CU-cw 6XD 6MZ 6HH 6JE-cw 6MK 6XAA 6ZR 6AGF 6ADA 6KC 6AA 6AK 6IK 6AJW 6APH 6APB 6APR 6KC 6WR 6EX 6TF 6AGM 6AD 6KL 6ZA.

Heard During May by ASA, S. Keller, Cashmere, Wash.

6AAR 6ABM 6AFN 6AFU 6AGF 6AIW 6AK 6APH 6APR 6FF 6GX 6IF 6KL 6KM 6MK 6QR 6ZA 6ZAA 6ZR 6ZX 7AD 7BC 7BJ 7BK 7BQ 7BV 7CE 7CO 7CW 7DA 7DG 7ED 7FI 7FQ 7GS 7IJ 7JM 7KW 7KB 7LD 7LG 7LM 7LN 7LS 7LW 7LY 7MY 7NL 7NN 7OF 7OQ 7RK 7YA 7YS 7ZG 7ZI-cw 7ZJ 7ZK 7ZM.

Calls Heard by 6KC from February 1 to June 1

5ZA 6AE 6AK 6AM 6AN 6CC 6DP 6EA 6EB 6FN 6FR 6FI 6FT 6FS 6GH 6GI 6GN 6HY 6IF (6IL) 6JD 6JM 6JR (6KA) 6KP (6LC) 6OH 6PD (6SK) (6TL) 6TV (6WH) 6ZA 6ZH 6ZK 6ZR 6ZU 6ZX 6ZZ (6AAK) (6ABP) (6ACX).



1800 VOLT TESTED .0005 MFD. GRID CONDENSER, \$1.00

Mica Dielectric and Cop-
per Plates, Mounted
Between Bakelite

Unmounted 50c

Special High Voltage
Condensers built to
your Specifications.

Catalogue, 20c

Western Electric Microphone Transmitter,
No. 323W, \$4.00.
Nickel-Plated Mounting Bracket, 50c.
General Radio Modulation Transformer de-
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pole double-throw panel Type.
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on a slotted bakelite form; 5 in. dia., with
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ated clips furnished.

**\$85.00 Paragon R. A. Ten Tuners
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New No. 56 Murdock Phones, 2000 Ohms,
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STATION 6BS has been heard at
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Pedro. Ensign J. B. Dow, U. S. N.,
formerly Radio Officer of the U. S. S.
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S. "California" reports the following:
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tube set by means of which any officer
may talk directly from his room to any
other ship similarly equipped or through
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phone stations to the land telephone
systems. In addition there are six
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complete receiving sets.

CALIFORNIAN OFF TO BUILD WORLD'S GIANT RADIO SYSTEM

Palo Alto, June 1.—R. R. Bealz chief
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hai to establish for the Chinese Govern-
ment a \$5,000,000 wireless communica-
tion system which will set a new world's
record for both dimensions and power.
It will exceed in these respects the
Lafayette-Bordeaux system in France,
which was also installed by the Palo
Alto concern.

One of the masts to be constructed will
be 1006 feet high, the tallest structure in
the world, the Eiffel Tower being 1003
feet, the guyed steel masts at Tuck-
erton, N. J., and the masts used in the
Lafayette-Bordeaux system being 850
feet high.—S. F. Call.

CORWIN DIALS

The distinction Corwin Dials
impart to a radio station is only
exceeded by their accuracy and
ease of operation. Prices are as
low as economical production
and efficient marketing will per-
mit, with due regard for quality.
*Outside of it all, there isn't any
particular reason for specifying
Corwin Dials.*

3" Dial, 75c—with knob, \$1.30
3 3/4" Dial, \$1.00—with knob, \$1.70
*At all Radisco agencies,
and other reliable dealers,
or sent postpaid anywhere*

A. H. CORWIN & CO.
4 West Park St., Newark, N. J.

FORMICA

SHEETS - TUBES - RODS

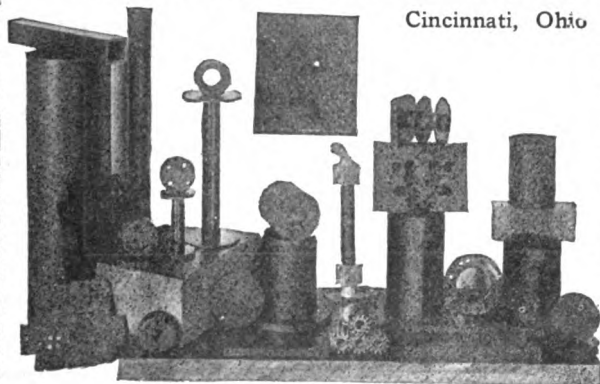
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof in-
sulation with exceptionally high dielectric prop-
erties. It is readily machined and does not
warp or shrink.

Formica is the ideal material for panels and
other insulation parts of Radio Apparatus, on
account of its superior electrical and mechanical
properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:
Hermans-Griffith Co., Sheldon Bldg., San Francisco
Jobbers: Leo J. Meyberg Co., 428 Market St., San Fran-
cisco; The Wireless Shop, 511 W. Washington St.,
Los Angeles, Cal.

Revolutionary Theories in Radio Com- munication

By **FRANK E.
SUMMERS**

SOMETHING
Decidedly
Different
in Radio Books

We will send you
a copy free of
charge if you sub-
scribe to "Pacific
Radio News" for 2
years.

Send your order
TODAY

**PACIFIC
RADIO PUB. CO.**
50 Main Street
San Francisco

COMPLETE SETS or UNASSEMBLED PARTS

We can supply all necessary parts for
those who build their own apparatus,
or complete, ready-to-operate sets.
Our complete stocks offer you a wide
choice of dependable apparatus at
reasonable prices.

A Few Specials:

Contact Points 3 for 10c
Binding Posts Brass 5c, Nickel 6c
Switch Units 40c each
Copper Aerial Wire, No. 14... 50c a lb.
Lightning Switches (100 amps. 600
volts) \$3.85 each
1/4 HP A. C. Meter \$17.50

*Reasonable prices, good apparatus, and cour-
teous attention has earned for us the confidence
of our radio friends. You, too, will find this
store a pleasant place to visit.*

Dreyfuss Sales Corp.

189 Greenwich St., New York

BRASS SWITCH CONTACT POINTS

Size, 7/32x7/32
Price with 1/2-inch screw \$0.20 doz.
Price with shank and brass nut .30 doz.
Price of extra nuts for same... .10 doz.
Add Postage
Order from Ad Satisfaction Guaranteed
Immediate Delivery—Try us
STRATTON ELECTRIC COMPANY
215 Federal St. GREENFIELD, MASS.

We Originate

Others Imitate

Announcing Benwood Synchronous Gaps

The finest rotary quenched synchronous rotary spark gap that has ever been produced.
Cut of this new gap not yet available for this issue, but we list herewith a few of the exclusive and outstanding BENWOOD features.

**Silent in Operation. Visible Spark. New Type Glass Insulators.
Removable and Renewable Point Rotor (exclusive feature, patent applied for.)
Oil-less Bearing (graphite). 3600 R.P.M. Synchronous Motor.**

By driving this gap with a 3600 RPM motor and using a FOUR POINT ROTOR, the most unusual and EXCEPTIONAL QUENCHING is obtained. The emitted wave is so sharp that it causes comment whenever heard. Designed for real DX WORK.

The new style GLASS INSULATORS do away with all electrical breakdown forevermore in gaps of this sort.

This Gap Will Greatly Increase Your Transmitting Range

Regardless of the remarkably new low prices, this is the best spark gap ever made.

WRITE FOR CIRCULAR

\$60.00 (bakelite case)

IMMEDIATE SHIPMENTS

65.00 (aluminum case)

For the next few weeks only we will sell the BENWOOD SYNCHRONOUS MOTORS separately. These motors are the quick starting induction type and are ball bearing. They run absolutely silent and employ no external controls whatsoever. They operate directly on the 110 Volt 60 cycle current. These motors are small but are rated at one-eighth HP.

1800 RPM \$32.50
3600 RPM 37.50

THE BENWOOD COMPANY, Inc.

1300 OLIVE STREET

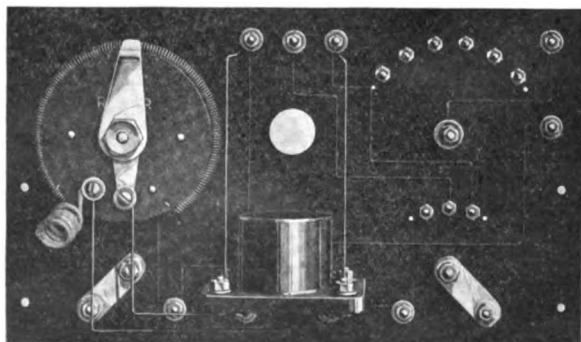
ST. LOUIS, MO.

Your one last opportunity—

July positively the last month this standard apparatus can be purchased at these tremendous reductions.

Audion Control Panels with VT
mounting, as illustrated.....\$11.00
Same as above, but without the VT
mounting, price 9.00

CESCO Variometers, each at.....\$ 5.50
CESCO Variocouplers, each at..... 4.50
Bakelite Base Crystal Detectors, very
special at 1.25



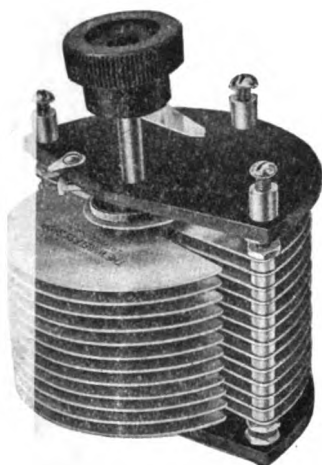
REAR VIEW OF AUDION CONTROL PANEL

This is the greatest panel value ever offered. It will not discolor like hard rubber, nor is it brittle or easily damaged. The panel is cut from solid sheet, not moulded. Surface highly polished. Lettering and scales machine cut, not stamped, and whitened. Metal parts heavily nicked. Filament rheostat back mounted. Wound for 5 ohms, it permits close adjustment of filament temperature. See prices above.

That you may be sure not to miss this unparalleled opportunity for saving, mail your orders at once to
CALIFORNIA ELECTRIC SUPPLY CO.—643 MISSION ST., SAN FRANCISCO, CALIF.

Radio supplies that R right

When writing to Advertisers please mention this Magazine



At Last, Fellows— —A Real Condenser— Built for Your “C.W.” Set

Wireless Shop Variable Condensers” Are Quality Instruments

That is the reason the up-to-the-minute amateur was so quick to recognize and specify them. Are you using them in that new set you are building? If not, why not? You can't go wrong, as we fully guarantee them to give satisfaction or cheerfully refund your money. You couldn't ask anything more.

The new “Wireless Shop CW” Variable Condenser was developed to meet the demand for a condenser which would not break down when used with high plate voltages. You don't have to take your receiving condensers to pieces and add spacers any longer. The NEW WIRELESS SHOP CW VARIABLE CONDENSER does the trick.

Heavy construction and only the best of materials and workmanship make this condenser even the most critical. These condensers are at the present time furnished in three sizes only, but if you need a special capacity for your own particular set, write us. We are well equipped to make you anything you may need in the condenser line, as that is our specialty.

—PRICES—

No. 1500—15 plate, approximately 0004 m. f. max. capacity.....\$6.00
No. 2500—25 plate, approximately .0006 m. f. max. capacity..... 7.50
No. 3500—35 plate, approximately .0008 m. f. max. capacity..... 9.00

Regularly fitted with mounting screws and knob and pointer. Will be supplied with a metal dial instead of pointer at 75c additional, or with a moulded Bakelite knob and dial, finely engraved with graduations and numbers filled in white at \$1.00 extra.

Postal charges and insurance must accompany all orders. Insurance charges on any of the above condensers is only 5c.

THE WIRELESS SHOP

A.J. EDGCOMB

511 WEST WASHINGTON STREET

LOS ANGELES, CAL.

When writing to Advertisers please mention this Magazine

RADISCO COILS

To buy Radisco Coils is to invest in permanent satisfaction at the lowest prices consistent with an unvarying standard of quality.

Radisco Coils, mounted and unmounted, in ranges to meet every known wave length, are available at the nearest Radisco agency listed below. They range in price from 70 cents to \$2.65. Larger sizes wound with 20/38 Litz at a moderate increase. Three of the larger sizes are also furnished with three taps, to give a wider wave length range.

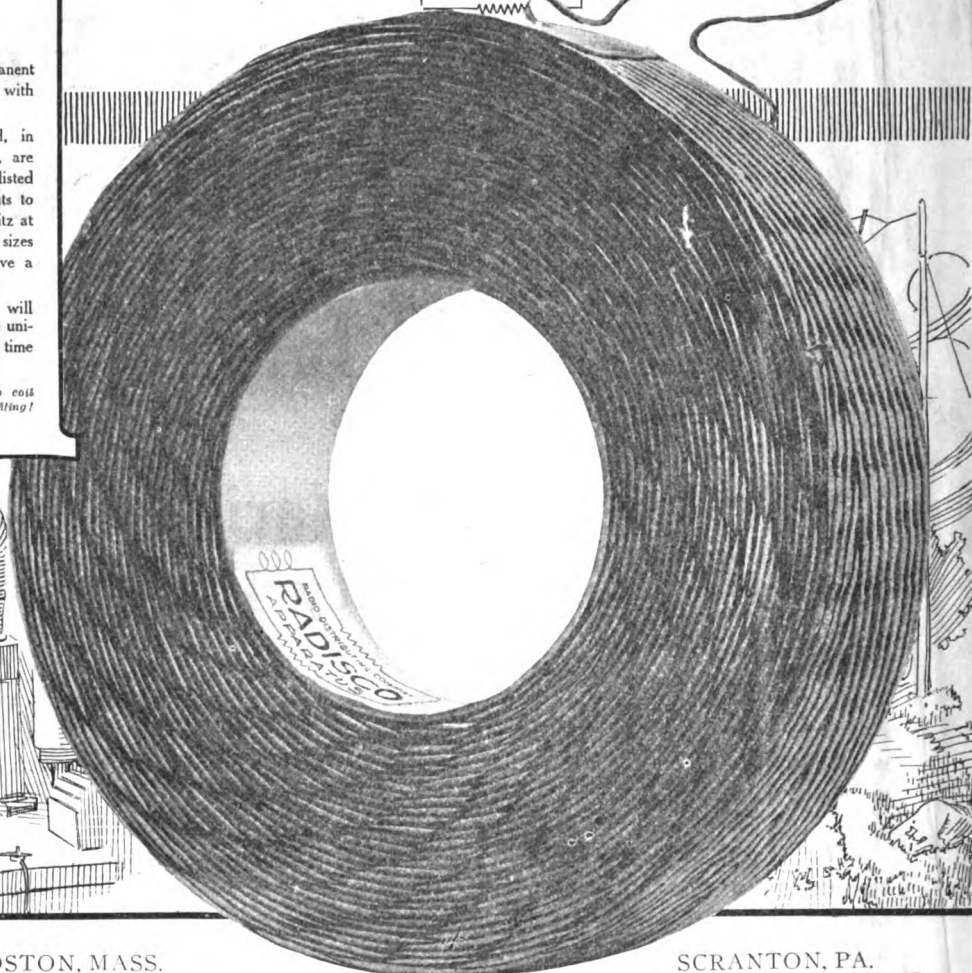
There is surely some Radisco Coil that will exactly fill your need. And remember, the universal winding that has stood the test of time will make good for you, also.

Note: If you mount your own coils, Radisco coil mountings are made to fit without bending or filing!

This Mark

RADIO-DISTRIBUTING-COMPANY
RADISCO
APPARATUS

Your Guarantee



THE RADIO DEALERS listed below are progressive merchants. They are equipped to give you helpful advice and real service in selecting your radio equipment. As an indication of their up-to-date methods, they carry a complete line of Radisco apparatus, including the new vario-coupler, Radisco Coils, Better "B" Batteries, Corwin Dials, etc. Go to the nearest Radisco agency, and be sure of satisfaction.

ALBANY, N. Y.
Shotton Radio Mfg. Co.
8 Market St.

ASHEVILLE, N. C.
Hi-Grade Wireless Instrument Co.

ATLANTIC CITY, N. J.
Paramount Radio Supply
Arkansas & Pacific Aves.

BOSTON, MASS.

Atlantic Radio Co.
88 Broad Street.

BROOKLYN, N. Y.
Kelly & Phillips,
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CHICAGO, ILL.
Chicago Radio Labs.,
1316 Carmen Ave.
Branch, Peoria, Ill.

EUREKA, ILL.
Klaus Radio Co.

KANSAS CITY, MO.
McCreary Radio Supply
4th and Delaware Sts.

NEWARK, N. J.
A. H. Corwin & Co.,
4 West Park St.

NEW ORLEANS, LA.
Rose Radio Supply,
604 Gravier St.

NEW BRUNSWICK, N. J.
Geo. N. DeLaplaine,
306 George St.
8th and Magnolia Sts.

OMAHA, NEB.

O. B. Radio Supply Co.,
406 Brown Building.

PHILADELPHIA, PA.
Philadelphia School of
Wireless Telegraphy,
Broad and Cherry Sts.

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Paul R. Collier,
154 E. Front Street.

PITTSBURGH, PA.
Radio Electric Co.,
3807 Fifth Ave.

PORTLAND, ME.
Atlantic Radio Co.,
15 Temple St.

PROVIDENCE, R. I.
Rhode Island Elec.
Equip. Co.,
45 Washington St.

SEATTLE, WASH.
Northwest Radio Service
609 Fourth Ave.

SCRANTON, PA.

Shotton Radio Mfg. Co.
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Branch, 8 Kingsbury St.
Jamestown, N. Y.

WASHINGTON, D. C.
Eastern Radio and Elec-
tric Co., 1405 Florida
Ave., N. W.

WICHITA, KAN.
The Cosradio Co.,
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BEINVILLE, QUEBEC
Canadian Radio Mfg. Co.

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The Vimy Supply Co.,
567 College Street.

To Responsible Dealers:
If you are in a town where
there is no Radisco Agency,
you will benefit by writing
for the Radisco plan.

RADIO DISTRIBUTING CO., Newark, N. J.

RADISCO

"Your Assurance of Satisfactory Performance"

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PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

"best I ever tried"---

THE A-P VT AMPLIFIER- OSCILLATOR

—the amplifier used by the U. S. Navy. "Use the tube the Navy uses."

Price \$7.

THE A-P ELECTRON RELAY

—the most sensitive detector of spark signals known to the radio art.

Price \$6.

THE A-P TRANSMITTER TUBE

—an efficient undamped wave transmitter for use in radio-telephony.

Price \$7.50.

A-P Tubes are licensed by the Radio Corporation of America under the DeForest Audion and Fleming patents for amateur and experimental use in Radio communication.

Order from your dealer or write direct.

"The last vacuum tube you gave me I find that it works the best I ever tried, it also oscillates fine, and sure can hear C.W. and spark stations loud and clear. The filament works around $3\frac{3}{4}$ volts."—Signed Stephen F. Pitoniak, 12 Valley Rd., Albion Pl., April 25, 1921.

Use A. P. Tubes and you will be equally enthusiastic. Use A. P. Tubes for efficiency, use A. P. Tubes for sure results, use A. P. Tubes for better results. There is an A. P. Tube for every purpose. Use *only* A. P. Tubes.

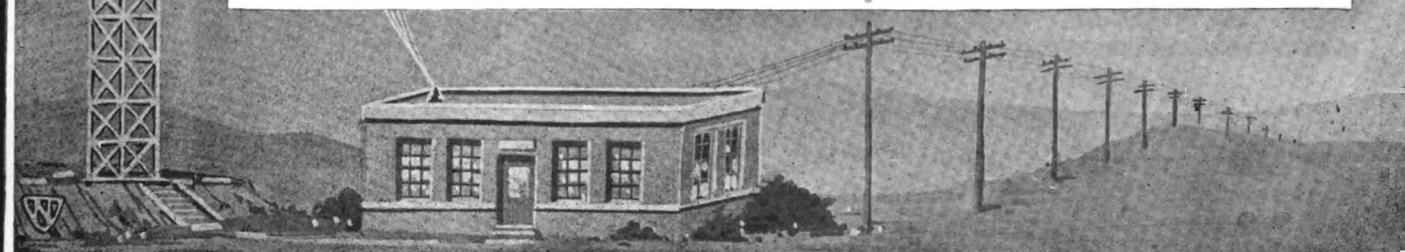
And for the best book on Radio, ask your dealer for "*Elements of Radiotelegraphy*," by Lieut. Ellery W. Stone, U. S. N., or order direct from—

The Atlantic Radio Supplies Co., 8 Kirk Place, Newark, N.J.

The Pacific Radio Supplies Co., 638 Mission St., S. F., Cal.

Distributors for Moorhead Laboratories, Inc.

use A-P tubes for efficiency





Nationally known since 1915.
General Electric Quality Plus
Cunningham Service.

The trade-mark GE is the
guarantee of these quality
tubes. Each tube is built to
most rigid specifications.

Why the Amateur chooses Cunningham Tubes

CUNNINGHAM Detector Tube Type C-300 functions as a highly sensitive detector of spark radiation, a tone frequency amplifier and an oscillator for regenerative amplification and C.W. reception; also as a radio-phone detector and amplifier. It possesses these combination properties to a greater degree with the added advantages of low B battery and quietness in operation.

It possesses almost perfect uniformity in plate voltage, signal audibility and sensitiveness, sustained throughout the operating life, plus all the operating properties of the Ideal Amateur Tube. The mechanical

assembly is entirely by machine, further assisting in uniformity of operation and appearance.

The customary hissing or "bubbling" has been practically eliminated in Type C-300, resulting in extreme quietness in operation, and a completely silent telephone receiver in the absence of incoming signals. This permits the reading of faint signals and exact adjustment for maximum sensitiveness.

The Amateur realizes that in Cunningham Tubes he has all that five years of service and General Electric Quality can mean to the Radio Field.

Dealers: Standard Packages F. O. B. Cleveland, San Francisco,
New York. Broken Packages F. O. B. San Francisco.



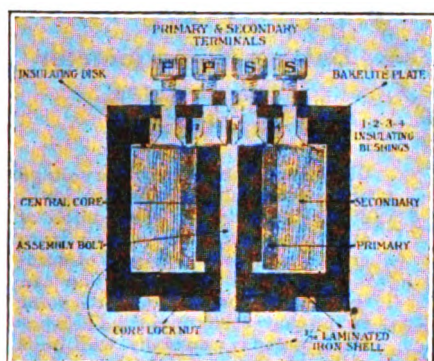
35 Montgomery Street

Trading as Audiotron Mfg. Company
Since 1915

San Francisco, Calif.

SACO CLAD

Announcing the
100% SHIELDED TRANSFORMER

The 3-16" continuous shell of laminated silicon steel serves three purposes.

(1) A perfect path for the magnetic flux.
(2) A 100 percent magnetic shield—eliminates howling on even six stages and diminishes tube noises.

(3) It is literally impossible to damage a Saco Clad by physical forces.

No other transformer at any price has such outstanding features.

Don't accept substitutes. Demand the Firco Saco Clad put up in separate cartons bearing the Firco Trade Mark.

SIX STAGES AUDIO FREQUENCY —THE BANDMASTER SAID "STOP!"

A week ago a stranger walked into our offices. He was soon talking about Saco Clad transformers and, without a word of exaggeration, here is what he said:

"... and during a recent municipal demonstration with our Six Stage Saco Clad Amplifier, the amplification was so great that our radiophone music interfered with the local band and could be heard $\frac{1}{4}$ of a mile thru the hubbub of the city's noises. . . ."

Another letter from a disinterested dealer says:

"... We have tried practically every make of transformer and believe that Saco Clad is by far the best transformer of them all. . . ."

If you study the cross section at the left, you will see the reason for these commendations.

A Summer Necessity—Saco Clads and Vocalouds

Saco Clad amplification pulls a Vocaloud (advertised last month) means you can carry on your radio activities in comfort during the hottest Summer days—just sit back and listen to loud, clear signals and radio phone concerts from the Vocaloud—no head phones or straining for weak signals. And of course, any number of friends can listen with you. This combination is economical. The Saco Clad Transformer is only \$5.00; after July 15th the Laboratory Type Vocaloud will be \$25.00 and the station type \$30.00.

If your dealer hasn't these instruments in stock, it is easier for him to sell you something else—but you should demand that he obtain them. Then make every possible comparison.

DEALERS: We have a new loose leaf catalogue for radio dealers. A charge of \$.25 is made to all except dealers. Amateurs should go to their radio dealer and ask to see this catalogue.

NOTE: Ask your dealer to show you the Firco Audion Units. They are made in two units—Standard and Midget—and are absolutely the best buy on the market.

John Firth & Company, Inc., 18 Broadway, New York



**FIRCO Audion Detectors
and Amplifiers
Radio Frequency Amplifiers
High Voltage Units**
(with any primary voltage)

Baldwin Phones

Firco Vocaloud

Saco-Clad Transformer

Firco Accessories

Kolster Decremeter

United States Bureau
of Standards Wavemeter

Eldredge Meters
(individually calibrated)

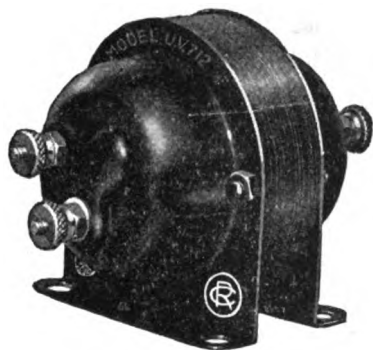
Brownlie Phones
(adjustable)

FIRCO RADIO

EQUIPMENT

"Pioneers—since 1901"

For Receiving Circuits



Amplifying Transformer

Model U. V. 712

Price, \$7.00

A new inter-tube tone-frequency amplifying transformer designed to make Radiotron Detector, U. V. 200 and Radiotron Amplifier Tube, U. V. 201, the most effective vacuum tubes on the market today. Tests have proved this conclusively.

Special bulletin containing detailed data and circuit diagrams for the use of U. V. 712 will be sent upon request.

These Standard Grid Leaks are in use everywhere in radio circles, from the largest laboratory to the most humble amateur station. They are of rugged construction, and of uniform and constant resistance. These Standard Grid Leaks are an absolute necessity for stabilizing the operation of vacuum tube detectors and amplifiers.

Write for our Grid Leak Bulletin. It explains the use of Grid Leaks in radio-receiving circuits.



Standard Grid Leak

Complete, \$1.25

Mounting only, \$.50. Units any value from .15 to 6. megohms, \$.75

AMATEURS

The four accessories here illustrated are made according to the same high standards set for Radiotron Vacuum Tubes — now famous throughout the amateur field.



"A"

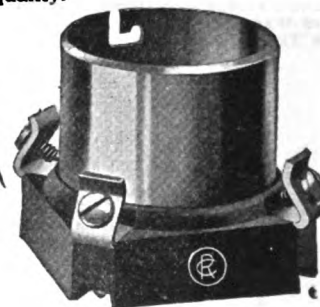
Battery Potentiometer

Model P. R. 536

Price, \$2.00

Close variation of the plate voltage of detector tube, Radiotron U. V. 200 often means the reception of otherwise unreadable signals from great distances. Using our Potentiometer, Model P. R. 536, you can really locate the most sensitive point on the characteristic curve. This potentiometer is unusually well built and superior to those heretofore supplied to the trade.

Thousands of these sockets are now in use throughout the amateur field. They will fit the Radiotrons U. V. 200, 201, and 202, insuring reliable contact under all operating conditions. Moulded unit made to fit and last, and backed by the R C stamp of quality.



Standard Bakelite Socket

*for Radiotrons U. V. 200,
U. V. 201, U. V. 202*

Price, \$1.50

IMPORTANT

A full line of apparatus for C. W. transmission is now in process of manufacture and will be available September 1.

DEALERS

Here is an unusual opportunity to handle the products of the greatest organization of its kind. Be one of the first to profit by this line.

Write Today

Radio  **Corporation**
of America

Sales Division, Commercial Department, Suite 1804
233 Broadway, New York City

Consider your battery:

EVEREADY

The best wireless B battery is none too good for you.

Unusual results in range and clearness are being secured by the users of Eveready wireless batteries, because they are built especially for radio uses and with a full knowledge of radio requirements.

Eveready wireless batteries are made by the world's largest manufacturers of dry cell batteries and are members of a family holding a long and honored record of achievement.

The Eveready label is a guarantee of a superior battery—and results.

For sale by electrical dealers everywhere.

National Carbon Company, Inc.

599 EIGHTH ST., SAN FRANCISCO, CAL.



No. 774

Number 774 B Battery is made up of 27 cells connected in series. The wooden case containing this battery is impregnated with melted paraffine and solidly packed and sealed in paraffine with a half-inch of sealing wax added after the cells are in place, making of the whole a unit impervious to moisture. One negative and six positive terminals have heavy brass screws and nuts. This battery allows a range of 18 to 43 volts in steps of $4\frac{1}{2}$ volts. Dimensions over all, 9 inches by $3\frac{7}{8}$ inches by $3\frac{1}{8}$ inches deep. Price \$5.00.



The RADIO MAGNAVOX

NOW TAKES ONLY ONE AMPERE IN THE FIELD

The Radio Magnavox will reproduce signals louder than any other type of receiver. The force acting on the diaphragm of an electro-dynamic receiver is the product of the magnetic field strength (H), the length of the conductor (L) in the influence of the field, and the strength of the current flowing through the conductor (I). I in radio is the incoming signal * * * We make L and H very large, and as the formula is $L \times H \times I = F$, it is obvious that if L and H are constant and I is the varying factor, then F will vary with I. Therefore if L and H are made large factors, F may become comparatively large even when I is very weak.

THAT IS THE SECRET OF THE RADIO MAGNAVOX

You cannot afford to be without one at your station especially at the very low price of \$45 from your dealer. See him at once.

The Magnavox Company

OAKLAND, CAL.

214 PENN. TERMINAL BLDG.,
NEW YORK CITY.

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KENNEDY
EQUIPMENT

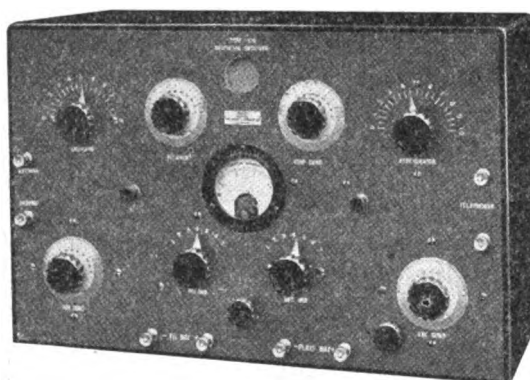
ANNOUNCING

THE NEW KENNEDY UNIVERSAL REGENERATIVE RECEIVER

Type 110

EFFECTIVE RANGE: 175 to 25,000 METERS

**DETECTS
REGENERATES
OSCILLATES**
on all wave lengths
in common use



Licensed
under Armstrong
U. S. Patent
No. 1,113,149

SURPASSING even our highest hopes when we undertook its development, this latest addition to the Kennedy line is **of interest to everyone who uses a radio receiving set.**

OUR engineering staff spent many months in developing this unit and released it for production only when its performance surpassed every requirement we had set for it. By our long specialization in receiving equipment we have built up a reputation which is so valuable to us that we can afford to put the Kennedy trade-mark on only the highest quality product.

WE have spared no effort to make this the best receiver on the market. **We honestly believe that it is.**

These are some of its features:

- Variable inductive coupling between primary and secondary.
- Extremely sharp tuning because of very efficient inductance units.
- Special Kennedy bank-wound moisture-proof inductors.
- Generous overlap between inductance steps.
- Large balanced primary and secondary variable condensers.
- Micrometer adjustment of secondary condenser.
- Variable grid condenser with air dielectric, permitting most effective use of all types of available receiving tubes.
- Adjustable feed-back circuit.
- Fine adjustment of plate voltage by means of potentiometer connected between terminals of filament battery.
- Weston ammeter for measuring filament current.
- Bus-bar type insulated wiring.

Further details in Bulletin 101, mailed on request.

ASK your dealer for a demonstration. Compare the performance of this receiver with any other you have ever seen.

The users of Kennedy Equipment are our best advertisers.

THE COLIN B. KENNEDY COMPANY

INCORPORATED

RIALTO BUILDING

SAN FRANCISCO

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Editor

LAWRENCE MOTT
Assoc. Editor

H. W. DICKOW
Advertising Manager
50 Main St., S. F., Cal.
Sept. Issue forms
close on Aug. 1st



PACIFIC RADIO NEWS

RADIOTORIAL

By LAWRENCE MOTT, Associate Editor



PUBLISHED MONTHLY

Subscription Rate
\$2.00 per year in
the U. S.
\$2.50 in Foreign
Countries

Copyright, 1921
Pacific Radio Pub. Co.

“VOLUME THREE, NUMBER ONE”

TO THEM that make our existence possible, i. e.: our advertisers, our subscribers and our contributors:

GREETINGS!

With this number of “Pacific Radio News” begins our third year in the field of radio publications, and it is entirely thanks to you **all** that we have grown from our erstwhile smaller form to our somewhat large and more dignified stature!

We deeply appreciate the loyal support that we have received from you **all**!

We are happily cognizant of your assistance in so many ways!

And we are indeed grateful!

In return for the recognition that we have received we have endeavored to make the publication both interesting and palatable—in short, **worth your while!**

We do not wish to err on the side of wearying frankness—hence we go not into a treasurer’s report of increase of circulation, and of advertising space. Were we so to do we might be thought to be lustily tooting our own horn—that we have no least intent of doing, as “PRN” does its own tooting!

We think, however, that we should—very respectfully—point out that this publication is the **ONLY** one that is not, in some way, more or less intimately connected with the trade in radio manufactures! Mind you, we do not intend to cast reflections upon any contemporary who is so connected. We are merely desirous that **you** should thoroughly understand our position—which is, in very brief:

To aid in the development of amateur radio.

To further its organization and success in all ways, and

To give due publicity to such apparatus—and results attendant upon their use—as seems to us to be normal and just.

We “play no favorites,” and what “tho” we have joyfully received a great many letters that are most flattering to our efforts with the publication—it will have doubtless been noted that we have never given one the light o’ day in our pages—preferring that our work stand upon its **own merits**—much as an all-round **man** stands upon his own two

feet, without seeking something to lean against—or upon!

We have tried to keep our pages clean of bogus and fraudulent matter—thus protecting the advertiser as well as the reader. We have sought to make our reading pages of a real value to the amateur—from the veriest tyro, to him who is far along the radio way. We have endeavored to eschew the dry-as-dust, and our generous contributors have gone to much trouble in order that the **beginner** might “get the idea” without becoming involved in too many technicalities—at first.

* * * * *

You have seen for yourselves our growth in the passed three years.

Our future lies—as must that of all publications—in the hands of our friends.

To these—and to them that we hope to make such—we express our earnest intent to keep “PRN” on a high level of radio interest, and up-to-the-minute with the latest information with regard to new apparatus, legal matters appertaining unto radio, and in touch with all things of general interest to the would-be amateur, the amateur and the super-amateur!

Selah!

FIVE DAYS LATER

EFFECTIVE with the current issue, “Pacific Radio News” will be ready for distribution on the 25th of the month instead of the 20th, as has heretofore been the custom. The September number, therefore, will be ready for the mails on August 25th and should be in the hands of every Western subscriber no later than the 28th of the month. Eastern subscribers and those

who purchase the publication from news dealers will receive their copies on the first or second day of the month. The closing date for advertising and editorial forms remains unchanged. All material for publication in the September number should be in our hands no later than the first of August. With the new distribution date set for the 25th of the month the publication will be on sale practically throughout the

entire month bearing the date of the issue.

Subscribers who do not receive their copies on the dates mentioned above should notify us at once. All changes of address should be filed with the post office as well as with the publishers, as several dozen copies of the previous issues have been returned, due to neglect on the part of the subscriber in notifying both parties of the change.

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In Article III it was stated that a method for printing radio telegraphic signals by means of an ordinary Morse recorder would be described.

Let us consider the characteristics of a so-called "soft" or detectortube. See Fig. 2. It will be noticed from this curve that it takes only a small negative grid voltage to reduce the plate current to almost zero. In practice it will be found that six to eight volts negative on the grid is sufficient to practically stop the plate current. Because of the steepness of the characteristic curve, if the plate current has been nearly stopped by a negative grid voltage, it will take a very slight positive voltage on the grid to cause a considerable plate current to flow. This is the property of a "soft" tube which makes it suitable for a controlling device for a relay. See Fig. 12 for

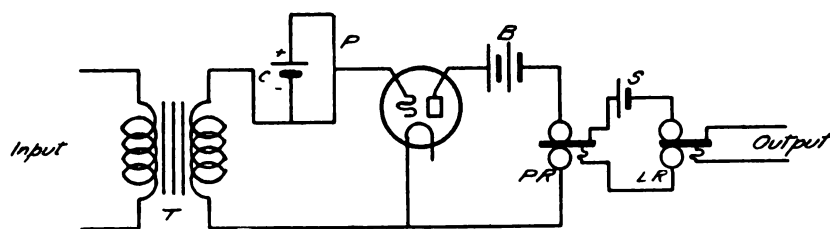


Fig. 12

connections. Hence, if in the circuit shown we make the grid sufficiently negative so that the polarized relay in the plate circuit will just cease to act, as soon as a very small a. c. emf. is impressed on the grid (an incoming radio signal), the positive halves of the a. m. grid voltage will reduce the negative charge on the grid sufficiently to allow a small plate current to flow. This change in plate current will be amply sufficient to operate the polarized relay. This arrangement has been actually used and works satisfactorily on loud signals, hence for good results one should have at least two or three steps audio frequency amplification preceding the "relay" tube.

The following points should be observed for best operation:

1. The "relay" tube should be a so-called "soft" or gaseous tube.
2. The "relay" tube should have its own plate battery, usually about 22.5 volts, so as to avoid interference from other circuits.
3. The grid battery should be about ten volts and should be provided with a smooth acting continuously adjustable potentiometer (not step by step) of at least 5000 ohms, so as not to unduly run down the battery. A graphite rod will not do, as the contacts on it are far too unsteady.
4. The polarized relay should be a high grade one of at least 10,000 ohms resistance. The relay must be connected properly in the circuit or it will not work, the binding post, as always, provided with polarized marks.
5. The extra relay should be an ordinary telegraph relay having about 500 ohms resistance. A condenser of about one-half of one microfarad capacity should be connected across the contacts of the polarized relay to eliminate sparking as much as possible. The object of the extra relay and of the condenser are to protect the contacts

of the polarized relay. The battery operating this second relay should be as small as possible, but still of sufficient size to insure positive action of the extra relay.

6. The method of adjusting the circuit in Fig. 12 is as follows: Open the grid circuit and with the filament burning and plate battery connected, adjust relay. Contact so that the relay will just contact firmly as indicated by the Morse recorder, then close the grid circuit, starting with zero grid make the grid just sufficiently negative to cause the relay to release. The circuit is then ready for operation.

At this point the reader has a right to ask the following question: How about static, power line induction, noises due to

street car trolleys, etc.? Will they not make an arrangement like this useless? The answer is, that they will, provided they are too strong or proper means are not provided to reduce them to an intensity where they will no longer disturb. If it becomes necessary to reduce them, a filter must be installed in the audio frequency circuit, preferably between the detector and audio frequency amplifier. See Fig. 14 for connections. In this circuit the condenser (C) has a capacity of 0.02 mfd. Both coils of the air core transformer (L) have a value of one henry each and the condenser (S) has a value of 0.01 to 0.05 mfd. and should be adjustable, at least in steps. The transformer (T) is an ordinary audio frequency amplifier transformer. The intensity of disturbances which still get through this arrangement can be controlled by the coupling at (L). It will usually be necessary to add a step to the audio frequency amplifier to make up for the losses in this filter.

It will undoubtedly take the average amateur, unless he has had considerable experience, considerable time to get an arrangement of this sort to work properly. He therefore should not become discouraged if he fails to make it work at first; he must design and make all details carefully if he is to expect results.

The following general hints will be found of value in amplifier work in general. The following are the usual causes for "noisy" operation of amplifiers, provided all, transformer, choke, etc., are properly designed:

1. Loose or dirty connections. All connections that are not made by means of substantial binding posts must be soldered. Springs in tube sockets must be sufficiently firm and properly adjusted.
2. Poor filament rheostats. These should always be of the step by step variety, provided with a good switch and never of the ordinary slide wire type. The resistance wire in the slide wire types becomes oxidized due to heating and the action of the air, and the result is that an excellent

microphone instead of a good contact develops at the point where the slider contacts.

3. Defective plate batteries. Miniature storage batteries are the best. These are available on the market from the reputable battery manufacturers at a very reasonable cost. I recently investigated this matter and found that a 110 v. bank of cells would cost about the same as sufficient flashlight cells (110 v. battery) to last a year at the rate flashlight cells last when five or six tubes are operated from them. If flashlight cells are used, they should be properly mounted in containers filled with paraffine and means should be provided so that individual cells may be cut out as soon as they go bad, as one bad cell is quite sufficient to make an amplifier very "noisy." A lamp of the proper voltage and size, and never a voltmeter, should be used to test cells, as a voltmeter may easily give a false impression as to the condition of a cell due to the fact that it does not draw sufficient current to actually test a cell.

4. It may be found necessary to screen an amplifier from stray fields due to lighting circuits, etc., in order to make it quiet. A sheet iron box is the cheapest and best for this purpose.

5. The connection on the filament batteries of an amplifier should always be kept clean and free from corrosion in order to insure steady operation of the tube filaments. The best way to accomplish this for either Edison or lead storage batteries is to first scrape the connection clean, then tighten the connecting bolts as tight as possible without stripping the threads and finally giving the entire terminal a coat of vaseline.

The question as to whether tubes can be successfully operated on alternating current for receiving purposes is often asked. Tests show the following results:

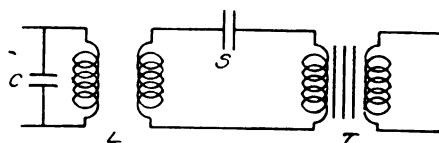


Fig. 14

1. For a single detector tube working in either an oscillating or non-oscillating circuit, fairly good results can be obtained. The hum produced by the a. c. is not sufficient to be very troublesome.

2. For an amplifier, if one does not exceed one step and is content with moderate amplification, the results are fairly satisfactory. If more than one step is attempted, the hum produced by the a. c. will drown out the signals.

3. For a. c. operation tubes having a stream line filament should always be used, as the hum is far louder with a tube having a so-called "hairpin" filament.

In conclusion, it is hoped that the material presented in this series, of which this is the last article, will be of some value to the radio amateur in solving his amplifier problems.

THE MAGNETIC AMPLIFIER

A Treatise on its Theory, Design, and Construction.

By Jennings B. Dow

Published by Permission of the Secretary of the Navy.

PART III.

FOR reasons which will be seen later, the iron core for this device will be made up of two concentric cylinders of equal length, which are to be connected magnetically by means of suitable "washers" at either end. The space included between the cylinders and the "washers" is used to house the control winding. We shall wind the radio-frequency winding axially, i. e., at right angles to the control winding to eliminate any possibility of mutual induction. See Fig. 8. The general dimensions of the core are governed by

primary modulating device to 1.2 ampere.

$$\frac{NI}{I} = \frac{4300}{1.2} = 3600 \text{ turns required}$$

Number 20 D.C.C. magnet wire may be selected as the proper size. The method of selecting this wire will not be gone into detail with, at this time. It is based, however, upon a radiation factor of 5 watts per square inch, which is allowable for this class of solenoid construction.

With this wire, it is possible to wind approximately 600 turns per square inch of section; and a winding space six inches

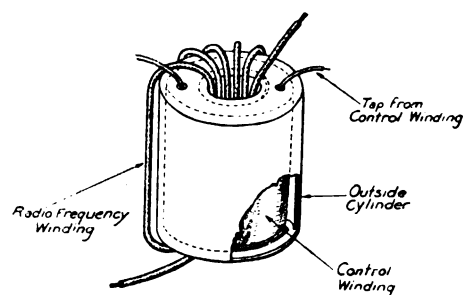
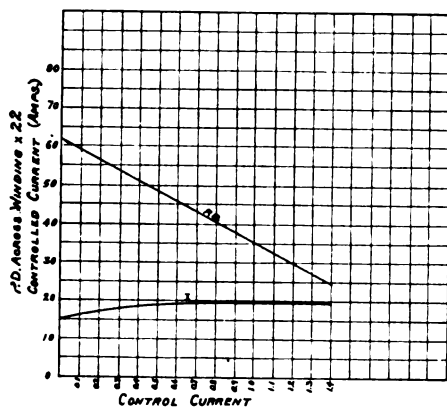


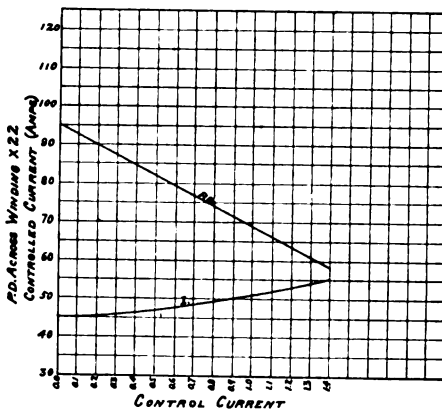
Fig. 8
View of 60 K. W. Relay

caution was necessary in order to prevent any induced currents from flowing around the lamina when changes in current in the control winding were taking place. It must be remembered that a short circuited turn having an appreciable resistance, induc-



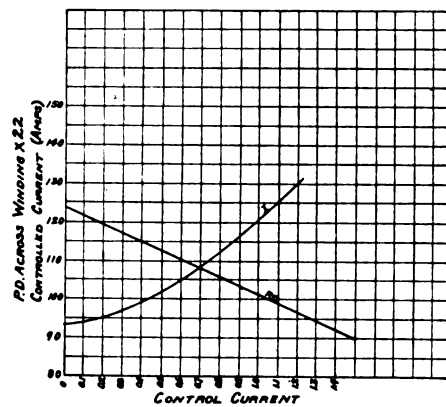
RESULTS OF 60 CYCLE TESTS.

Fig. 9.



RESULTS OF 60 CYCLE TESTS

Fig. 10.



RESULTS OF 60 CYCLE TESTS

Fig. 11.

two factors, viz., the cross section of the control winding and the overall diameter of the "Litz" used in winding the radio-frequency coil.

By referring to the curves, Fig. 1,

$$H = 180$$

$$B = 17800$$

$$r = 120$$

$$0.8B1$$

$$\text{and } NI = \frac{r}{0.8B1}$$

where NI = ampere turns

l = length of magnetic circuit
(This equals twice the length of the cylinders plus twice the length of the flux path thru the "washers.")

By means of an approximation, the value of l may be found to be about 36 centimeters. Substituting the values of B , M , and l in the above equation,

$$NI = 4300 \text{ ampere turns required in the control winding.}$$

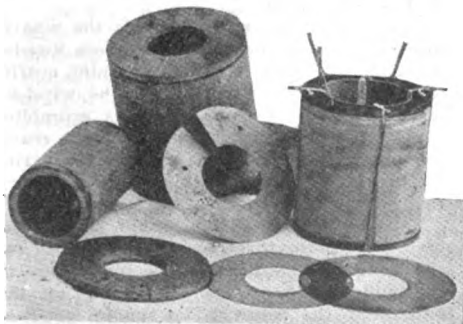


Fig. 14
Detail, 60 K. W. Relay

In this particular case, the maximum allowable control current was limited by a

long by one inch in depth will be used.

The core for this device was built up in the following manner. The sheets of "Apollo," as they are obtained from stock, are 30 by 96 inches. These sheets were cut into strips 6 by 96 inches, and strips of 5 mil fish paper were cut to similar dimensions. A 3-inch wood mandrell was next made and placed between centers in a lathe and the process of winding the smaller cylinder was begun. The strips of iron and paper were wound together in order to prevent short circuited turns of iron, and successive strips of iron and paper were wound up in this manner, care being taken to wind same as tightly as possible. This made a cylinder having a wall one-half inch in thickness.

The larger cylinder was constructed upon a mandrel 6 inches in diameter and in a similar way. Only thirteen complete turns of iron and paper were used, however, in order that the cross section of the two cylinders might be equal. This made up a cylinder having a wall slightly over one quarter inch in thickness.

After each cylinder was completed, the ends were cut back one-sixteenth inch to provide a smooth surface and each cylinder was covered with a layer of cotton tape and shellaced.

The end pieces, or "washers," which connect the two cylinders magnetically, were built up of lamina of the same grade of iron as was used in constructing the cylinders. The fact that the magnetic circuit thru these "washers" had to have the same cross sectional area at all points, was carefully considered in the design of these "washers." A gap having a width of one-sixteenth inch was cut in each lamination to open the loop formed by it. This pre-



Fig. 13
Partial Assembly, 60 K. W. Relay

tively related to any circuit in which a changing current is flowing has the property of damping the changes of current in the circuit. In assembling these "washers," each lamination was insulated from the next with 5 mils of fish paper. The "washers" were, in turn, insulated from the cylinders with 10 mils of mica, which overlapped the cylinders slightly to prevent any possibility of sparking due to induction from the radio-frequency winding.

The control winding was made in two
(Continued on page 29)

A HARD-BOILED BUNCH

BY V. G. MATHISON

Author of the Samuel Jones Series

MAYBE some time or other while thumb-in' the pages of your call-book you have come across the call letters K-V-I. If you did, they probably didn't interest you. All the book has to say is "K-V-I, Unga Island, Alaska." There ain't no details, an' the type is pretty small. By rights it should be printed in letters a foot high, while as for th' details—well, a while back I happened to get acquainted with some of 'em, as you may judge when you peruse the following:

It all started one day up in Cunningham's office, when I was grumblin' about the seagoin' wireless game.

"This goin' to sea is the bunk," I tells Cunningham. "For th' last ten years I've been hoppin' from one berth to another like a flea in a ten-cent lodgin' house, an' I'm gettin' sick of it. First thing I know I'll be growin' old an' gray at this game; an' I'll be a pretty lookin' sight poundin' brass with a long white beard draped around th' receivin' tuner, or hangin' down into th' drip-pans of th' motor generator. I'd like to land a nice steady shore job some place where I could settle down an' spend th' rest of my life in peace an' quiet."

"If you mean that, you've took the notion into your head at just the right time," exclaims Cunningham. "The Alaska Codfish Company down on Steuart street are looking for a man to go up to Alaska and run their wireless station on Unga Island."

That afternoon we breezes down to Steuart street, an' Cunningham introduces me to the big chief of the cod-fishin' concern, a gentle an' friendly ol' war-horse with a sea-tanned map an' snow-white hair.

"Unga Island is the largest island of the Shumagin group, on the south side of the Alaskan peninsula," he tells me. "It's about half way between Kodiak Island to the northeast and Dutch Harbor to the southwest. There is a naval radio station at both of these places, but none in the six hundred mile stretch between. That is why we built a station of our own on Unga Island. The station is at Unga, an Aleute village on the southern end of Unga Island, where we also have the headquarters of our cod fisheries."

"Is it a quiet place?" I asks.

"A mail boat calls at the island about three times a year," he answers. "And there is otherwise no touch with the outside world, except through the wireless station. There are no passenger steamers running there; in fact, no vessels of any kind but our own fishing schooners. It should be quiet enough, if that is what you want."

"Yes," I replies. "Is it a permanent job?"

"Absolutely," he answers, in a tone like he meant it. "In fact, you will be required to sign a contract to stay two years. I can assure you that you'll like Unga. You have a fine two kilowatt set to handle; and the people are very congenial."

"Then what's th' present operator leavin' for?" I asks. "Is he retirin' on account of old age?"

"No, he has—he has ceased to operate," he answers, with a queer kind of a twinkle in his eye. I didn't exactly understand that, but I guessed it was all right, an' I signs the two-year hitch.

Three days after, I gets aboard the "Ma-weema," an ancient-appearin' an' bad-smellin' three-masted sailin' schooner, loaded to th' scuppers with salt, an' tough-lookin' codfish snailers. A tow-boat drags us out through the Golden Gate, an' we shake out our rags to a cold head wind. Soon as we was clear of the land, all hands gets drunk. I puts in a few pleasant nights listenin' to the fishermen an' sailors forward fightin' an' howlin' an' whoopin', while in the cabin th' skipper an' the mates gambled an' squabbled an' raised particular hell. Meanwhile the wind changes into a southeasterly gale, which takes us off shore a-flyin'. The farther we went, th' harder she blowed. Jibs an' mainsail were ripped to rags; a top-mast comes down; th' deck-load goes adrift; an' to make things more comfortable, a sea tears off th' cabin skylight one night, an' I wakes up to find my grips sloshin' around in a couple feet of sea-water.

After forty-three days of head winds an' hurricanes, we sights Simeonof Island, a gigantic snow-covered pyramid of lava stickin' up out of the ocean, on the outer edge of the Shumagin group. A squally southwest gale drove us by Simeonof, an' on into the Straits of Nagai, where I had my first look at Unga Island. It was about eighteen miles long, an' maybe six wide, fringed with reefs an' rocks, an' topped with two towerin' white peaks. We comes sweepin' up Nagai Straits on the wings of the snow-storm, an' comes at last to anchor in Squaw Harbor, a little cove on the eastern side of Unga Island. Accordin' to the charts, the town of Unga was about eight miles away, on a little inlet called Delarof Bay.

The next mornin' a power-boat, the "Alasco II," comes round from Unga, an' I goes back on her. She was piloted by a crazy-lookin' highbinder with a long droopin' black moustache, an' a pair of fists like rhinoceros' knuckles. After informin' me that his name is Hammar th' Head-Cracker, he inquires who I am. When I tells him I'm a key-puncher, he looks glum.

"Yuh won't be here long," he says, darkly. Then he shuts up like a clam.

After skirtin' a few miles of high, dark cliffs, we finally swung into Delarof Bay; an' I saw the town of Unga. Down at the foot of a steep, snow-blanketed mountain I saw a gloomy-lookin' village—frontin' on the bay a hundred small houses an' shacks; down on the beach some weather-beaten warehouses an' sheds. Up on a knoll in the middle of the town stood a government commissioner's combination dwellin'-shack an' court-house; below that a hard-lookin' dance hall grinnin' in the face of an old tumble-down Russian church. Farther up on the rise was a cemetery twice the size of the town, bristlin' with white-painted crosses, set so thick that from the bay they looked like a field of daisies.

Just above a little wharf, juttin' out from

the beach, was a steep, rocky knoll about a hundred feet high, an' on top of it were the wireless masts. They were maybe a hundred an' thirty feet high, an' four hundred feet apart, an' were loaded down with heavy guy-wires—to keep 'em from bein' blowed clean to Kamchatka, the Head-Cracker explains.

Half way down the face of the hill was the station house, a white-painted shack hangin' by its eyebrows on a narrow ledge of granite that stuck out from the cliff. The heavy swell from the Pacific was boomlin' against the rocks just underneath, an' sometimes a cloud of white spray went flyin' up over the shack.

Just as we were swingin' up to the wharf there appeared a little spurt of pale-blue smoke up on the hill above the wireless shack, an' about the same instant a bullet smashes one of the window panes in the front of the pilot house.

"Duck below!" yells the Head-Cracker, as another bullet rips a cloud of splinters off the window sill, an' a third one puts a dent in the compass binnacle. Without askin' no questions, I dives inelegantly down a companionway into the engine room. As I crawls up behind the engine, on the lee side from the bullets, I sees the Head-Cracker haul a young cannon outa his jeans an' start blazin' away at the guy up on the hill. He empties his six-shooter, reloads, an' empties her again—meanwhile the fellow on the hill busts a few more panes of glass, an' puts half a dozen holes through the bulkhead. Just as the Head-Cracker was loadin' his gun for the fourth time, the shootin' from shore stops.

"Is th' battle over?" I asks, stickin' my head up through the companionway, cautious like.

"Not by a damn-sight!" roars the Head-Cracker, stowin' away his Krupp-junior. "It's only postponed till I git ashore—I'm gettin' weary of arguin' with that guy!"

"Then it was you he was bombardin', not me," I exclaims, feelin' a lot relieved.

"It's Hog-Tooth Wilson," sputters the Head-Cracker. "Coupla weeks ago we was figgerin' who'd licked the most codfish snailers last year, an' Hog-Tooth figgered he'd licked one more'n I had, so I licks him to make it a draw. Now he's goin' snoopin' 'round gunnin' for me, which ain't no way to treat a friend."

By this time we was alongside the wharf. Gettin' ashore, I meets the Brainless Swede, the superintendent of the codfishin' outfit, who shows me the way up to the wireless house. The Head-Cracker comes grumblin' along with my grips, but soon as we reach the shack he drops 'em and goes swearin' off up the hill with his hip-pocket artillery ready for action again.

The rectangular-shaped radio shack was divided off into three small rooms; one for the sendin' apparatus, a sleepin' room in the middle, and an operatin' room on the end facin' the ocean. The sendin' set was a trashy-lookin' made-to-order rig, with a lot of helices to get a twenty-five hundred meter wave—a two kilowatt panel set with a flimsy synchronous gap coupled up to an old condemned hoistin' motor that'd been

made over into an alternator. This was belted to a contrary-lookin' one-lung gasoline engine, on the opposite side of the room—about a five horse-power. A second belt from the engine went to another made-over motor, which furnished direct current to excite the alternator. The transmitter had a leaky oil condenser, a hammy-appearin' transformer, with a secondary windin' about the size of a ball of knittin' yarn, an' a phony oscillation transformer that looked like it'd been squashed by an elephant steppin' on it. That was about all there was to it, except for a lopsided name-plate on the panel, announcin' it was a "Hellkum Special"—whatever that is.

I started in right away to get the set in workin' order, but I was bothered a lot by people stringin' in with messages. One guy, a fur-trader, brought twelve at one lick.

"Some of these is kinda previous," he remarks; "but I want'a get 'em off while you're still here."

"Still here!" I exclaim. "I just got here!"

"I know it," he answers. "Otherwise, you wouldn't be here."

I didn't exactly get the drift of that just then, but I did later. By night I had the set in shape, an' fifty-one messages on file. It was snowin' an' stormin' outside, an' at 5 o'clock it was pitch dark. I figures I might's well begin tryin' to raise N-P-R, so I starts the engine; but when I gets in, I hears a devil of a racket bustin' up the ether. Listenin' awhile, I makes out it was N-P-R an' another loud synchronous spark signin' K-O-X-N, which I learns later was another codfish company station. They were havin' a grand wireless battle.

"I can pound brass a damn sight better than you ever will pound it, you mush-room-flated son of a sourdough biscuit!" I hears the codfish code-slinger yellin' at the navy gink. "If you ever make any more breaks about my flat, I'll come up there an' make your homely map look like a busted tomato!"

"Aw, dry up, you fire-eatin' moonshine-guzzler," answers the gob at N-P-R. "You've got so many codfish fins growin' on your back you can't keep your shirt on no more,—better go jump in the ocean, where you belong, fishie."

"I'll fix you yet, you flat-footed, knock-kneed squaw-chaser!" howls the codfish key-puncher. "I'm goin' to fill you so full of lead you'll have to go to your grave in a ten-ton truck!"

This keeps on for about half an hour, until both the gadget an' the codfish desperado was so mad they could only stutter on their keys like a couple of crazy omni-graphs. At last, I risks a call to N-P-R, but all I gets is a roar of Q-R-T's for about ten minutes; then all of a sudden I hears a new flat take the key at the navy station.

"K-V-I, K-V-I de N-P-R, N-P-R," he says. "Never mind those two little honey-birds—just havin' their usual evenin' lovin' match—both full of sourdough brew—bad stuff—I got your biz of last two months—seventy-two messages—Q-R-V."

"Yes, all set," I answers. "Got fifty-one here."

About 11 o'clock I had all his messages. I starts in to shoot mine, but before I'd got more'n seven or eight of 'em away somethin' goes flooey with the transmitter. I dashes into the power room an' discovers the sendin' condenser is shot. It takes about fifteen minutes to fish the busted section out of the oil an' stick in a new one. I starts hammerin' again, but on the sixteenth message the spark goes out of synchronism, an' dies slowly away.

I rambles out into the power room again, an' finds the couplin' between the gap an' the alternator is carried away. Lashin' it up temporary, I tackles the key once more, but on the thirty-third message somethin' blew up again. This time I finds the power room full of smoke, an' I discovers the transformer secondary is burnt black as a newly-wed's biscuits.

"Looks to me like I landed one nice, peaceful quiet little hell of a shore job, all right!" I mutters to myself, as I shuffles out a couple thousand transformer laminations to replace the burnt secondary.

On the forty-ninth message the engine stopped. As the lights were on the direct-current generator, this leaves the shack pitch dark. I lights a candle, an' finds the fuel-pipe to the engine is busted off the carburetor, an' gasoline is runnin' all over the floor. Blowin' the candle out quite instantly, I bandages up the pipe in the dark with a piece of friction-tape. At last, soakin' with engine oil, gasoline an' sweat, I drags through the fifty-first message, an' signin' off with N-P-R, I turns in to dream of millions of shootin' condensers an' explodin' gas tanks.

The next mornin' I meets Dopey Drifffield, the government commissioner, a sleepy old worm who'd been in Unga more'n thirty years, an' who seemed to be sufferin' from a chronic case of Alaska lazylitis. He tells me he's learned somethin' about wireless from previous brass-pounders, an' has a little spark-coil ham set of his own.

"Say, what become of the operator before me?" I asks him, as we stand out in front of the town pool hall. He starts to answer, but just then a vampy-lookin' little black-eyed girl comes trippin' along an' gives me a sly, teasin' smile. I starts to return the smile, with interest, but Dopey punches me in the ribs.

"Look out!" he whispers. "That's Mexican Frank's wife—he's standin' behind you!"

I peeks around out'a the corner of my eye, an' when I sees a bad lookin' Mexican standin' close by, glarin' green-eyed at me, an' with one hand on his shootin' gear, my smile freezes fast.

"You was askin' about yer predecessors," remarks Dopey, after a minute; "I'll show you where they is."

Leadin' me out into the cemetery, just back of the town, he brings me up to three white-painted pine slabs, all set nicely in a row. Takin' a slant at the first board, I reads this cheerin' inscription, done in crooked black letters:

"HERE LIES STANLEY HINCH

A Wireless Operator

DRILLED BY LONG BILL'S COLT

On the Last Night of September, 1920."

"He was the first one," says Dopey. "He got full of moonshine one night, an' started singin' a Hungarian op'ra under Long Bill's bedroom window. Long Bill thought he'd got bit by a Malamute mad-dog an' was dyin' from hydrophobia, so he shot him to put him out'a his misery. Bill always was a kind-hearted ol' fence-rail."

By this time I was readin' the second slab:

"HERE LIES FRANK MYERS

A Wireless Operator

STUCK THROUGH THE GIZZARD

By Dago Mike in Soapy's Barroom

December 5, 1920."

"What'd he do?" I asks.

"He was a nice boy, but he was plumb foolish," replied old Dopey, pensive-like. "He mixed into a war argument in Soapy Komeda's soda water joint, an' said 't'hell with th' kaiser.' Right there German Charlie yanks out his gun an' makes the chauco stand up on th' bar an' repeat

'Hurrah fer th' kaiser!' fifty times, but before he could get done with it, Dago Mike, th' bartender, got peeved an' rammed a butcher knife clean through him—Mike always was a good patriotic Dago, so we couldn't blame him."

I didn't say nothin', but rambles over to the third signboard:

"HERE LIES THE LEFT FOOT AND THE RIGHT EAR OF EDGAR NELSON

A Wireless Operator

BLOWED TO HELL BY NITROGLYCERIN

February 7, 1921."

"Edgar stayed with us th' longest—three weeks," says Dopey, thoughtful-like. "One day he went to visit th' gold mine up th' bay, an' just fer a joke Hardpan Pete slips a can of triple X blastin'-caps in his pocket. Comin' back to town, Edgar fell down a cliff, an' all we could ever find was his left foot an' his right ear—we knew it was his right one because Bull Barney, th' moonshiner, had nicked it th' day before, practisin' with a new automatic. I was sorry to see Edgar go to pieces that way, but he had no business fallin' off'n the bluff."

"Seems to be a healthy place fer brass-pounders, don't it," I remarks, already seein' four little slabs in the code-slinger's row. "I know now what th' old bird in Frisco meant about that operator ceasin' to operate."

"There's only one wireless man ever stuck it out around these parts," replies Dopey, "an' that's Fightin' Hell-Fire, the guy that built this station. He's just built another at Pirate Cove, over on Popoff Island, about twenty miles from here. The call's K-O-X-N—mebbe you've heard him."

"Yes, I did, last night," I answers. "He seems to be a lunatic."

"That he is," declared Dopey, fervently; "an' he's a tough guy. Besides his reg'lar six-shooter he packs a little Colt automatic in his mackinaw pocket; an' th' other day I seen him shoot a wart off'n Black Ola's nose at a hundred feet without even pullin' th' gun out'a his pocket—shot right through th' cloth. H'll probably be over soon's we have a storm—he has a fishin' dory with a little engine in it, but he never travels unless it's blowin' a hurricane—says he gets tired moochin' along in a boat in calm weather."

Just as we was leavin' the cemetery, I notice a couple fellows comin' with picks an' shovels.

"They're comin' t' dig a hole for Hog-Tooth Wilson," says Dopey, yawnin' like it didn't amount to nothin'. "Th' Head-Cracker plugged him last night in self-defense—Hammar never would stand fer anybody abusin' him."

Durin' the next three weeks I didn't see much of anybody. I didn't feel like venturin' out of the wireless shack, an' anyway, the set didn't give me a chance. I never got through a schedule with N-P-R without a couple of breakdowns. First a condenser would shoot; then the gap-electrodes would strike an' break off; the gasoline pipe busted again; wirin' shorted in the conduits; fuses blew; the engine coolin' tank springs a leak an' floods the joint; an' chronic hot bearin's on the alternator throwed the belt off, which wound up in the engine flywheel an' got tore to strings. Considerin' everything, I had a right pleasant time.

The engine kept gettin' crankier every day, until at last she laid down on the job an' quit fer good. I primed an' oiled an' sweated an' swore, but 'twasn't no use. The next day it was blowin' a howlin' storm. Big seas were boom'in' against the rocks under the wireless house, roarin' like

(Continued on page 22)

A CONDENSER THAT HOLDS ITS OWN

If you have been experiencing trouble from condenser break-downs, here is one that will eliminate your trouble.

MR. H. C. BROWN (6CH) has a transmitting condenser that will hold its own against anything yet devised. The condenser operates on the oil-cooled principle and is remarkably efficient in operation. Many requests have been received from Pacific Coast radio men regarding the construction of the condenser and for this reason the constructional details are published herewith.

The only materials necessary for its construction are twelve aluminum plates, size 24 gauge; twelve sheets of a good grade of photo glass or window glass that is free from air-holes and other defects; a wooden tank container for the unit; two brass con-

merely short lengths of No. 15 soft drawn copper wire, bent as shown in Figure 5. Three of these separators should be riveted to each aluminum plate as shown. The purpose of these separators is to allow the oil to circulate between the units and thereby afford an excellent cooling surface for the entire condenser, the best method of preventing break-down.

In assembling the condenser it is important that a right hand plate faces a left hand plate. All right hand plates are connected together by means of a long threaded brass rod. Nuts should be used to secure each plate to this rod. The left

and fill the container with castor oil or a good grade of transformer oil.

This condenser has held up for many months under a strain of 45,000 volts. Many others failed to hold up under the strain. The total capacity of this condenser is .006 mf. each unit being .001 mf. capacity. To increase the capacity, add more units. It may be well to state that the entire unit should be firmly bound with tape, making it an easy matter to insert same into the container.

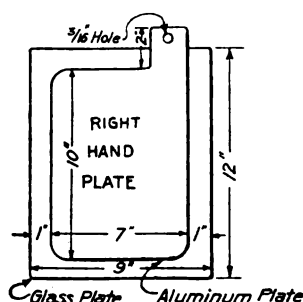


FIG. 1

necting rods for the plates and 36 lengths of No. 15 soft drawn copper wire for the use of separators.

The size of the glass plates can be obtained from the accompanying drawings. The aluminum plates must be cut as shown, with a lug cut from the same sheet as the plate itself. It will be observed from the drawings that there are two kinds of plates, left hand plates and right hand plates. Six of each are needed. The corners must be rounded as shown, and rubbed to a polish with steel wool to prevent all brush discharge. Six holes are drilled into the aluminum plates as shown in Figure 5. These holes are used to allow three separators to be riveted to the back of the aluminum plates. The separators are

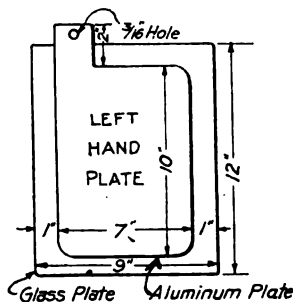


FIG. 2

hand plates are assembled in like manner. Binding posts should be attached to the ends of the connecting rods for the usual terminal connections.

The container best suitable for this condenser is, of course, either a glass or rubber case but the following method of construction for a container has been in use by 6CH for a number of years and has given excellent service: Construct a hardwood box, just large enough to hold the unit snugly. Before assembling the box give it one coat of diluted Le Page's glue. After the first coat dries, apply two coats of heavy glue. Then assemble the box with nails or screws and blue the edges, being careful that the glue covers all corners of the box. Allow the glue to dry

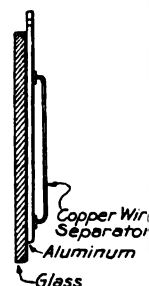


FIG. 3

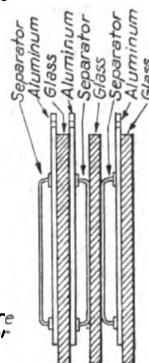


FIG. 4

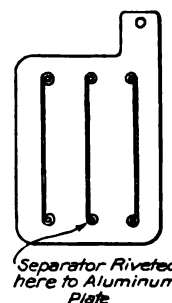


FIG. 5

STAG PARTY AT S. F. RADIO CLUB

JUNE 30th will long be remembered by the unusually large number of radio men who attended the San Francisco Radio Club's Stag Party. It was a lively affair from start to finish. Refreshments, musical numbers by radio telephone, smokes and entertainment were on the program of the evening. The radio raffle was the talk of the town. Vacuum tubes, meters, variometers, radio books, magazine subscriptions, tuners, phones, horns and an abundance of other apparatus were raffled.

The affair was given wide publicity by the various radio telephones in San Francisco and was a marked financial success.

STOLEN AUTOMOBILE RECOVERED BY WIRELESS

BOSTON has recovered its first stolen automobile by means of wireless. The recovery was reported by the Cambridge police and Scouts Charles and Edwin Barney of 20 Breamore road, Newton, have now qualified as radio sleuths.

The automobile, a Peerless roadster, owned by Arthur Vinton of Highland avenue, Somerville, was stolen near Harvard Square last week. A wireless flash announcing the theft was broadcasted Saturday night, in accordance with arrangements made with the Boston Police Department, and picked up by radio amateurs within a hundred mile radius.

Early one Sunday morning Charles Barney, aged 18, assistant scoutmaster, was walking near his home on Hunnewell avenue, Newton, when he discovered a car similar to the description sent out by wireless. The young man hurried home, secured the detailed data (registration, engine,

serial and model numbers)—which his brother Edwin had received with his small wireless outfit—and, finding that his information checked with that of the automobile, which was empty, promptly notified the Cambridge police. Two patrolmen answered the call and the machine today is resting in its owner's garage.

The recovery of the machine marks the first important result secured by the Boston Police Department in sending out wireless broadcasts each night in connection with missing automobiles, men wanted for misdemeanors, missing persons, etc.

About a month ago Commissioner M. J. Crowley secured the assistance of the American Radio and Research Corporation, Medford Hillside, and nightly police reports of the above description are broadcasted from the company's high-powered sending station. Reports are telephoned from police headquarters at Pemberton Square at the close of each day to the sending station at the factory of the American Radio and Research Corporation. The reports are then

flashed by both wireless telephone and telegraph. When sending out by telegraph the messages are sent very slowly at ten words a minute and are repeated three times to insure their reception. Wireless operators within a radius of one hundred miles pick up the reports and then are asked to refer them to the local police.

Returns have shown, according to the police, that the reports are distributed in the large majority of cases. Records are at hand which show that this has been done as far west as Fitchburg and as far east as Marion.

Reports are sent out from headquarters at Pemberton Square at 7:40 p. m. and are broadcasted by wireless at 8 o'clock at the Amrad station.

As there are many thousands of interested radio amateurs in the metropolitan district, it is expected that further notable achievements will be made in the near future.

6CH-

A SAN FRANCISCO STATION WITH AN ENVIABLE RECORD FOR LONG DISTANCE COMMUNICATION

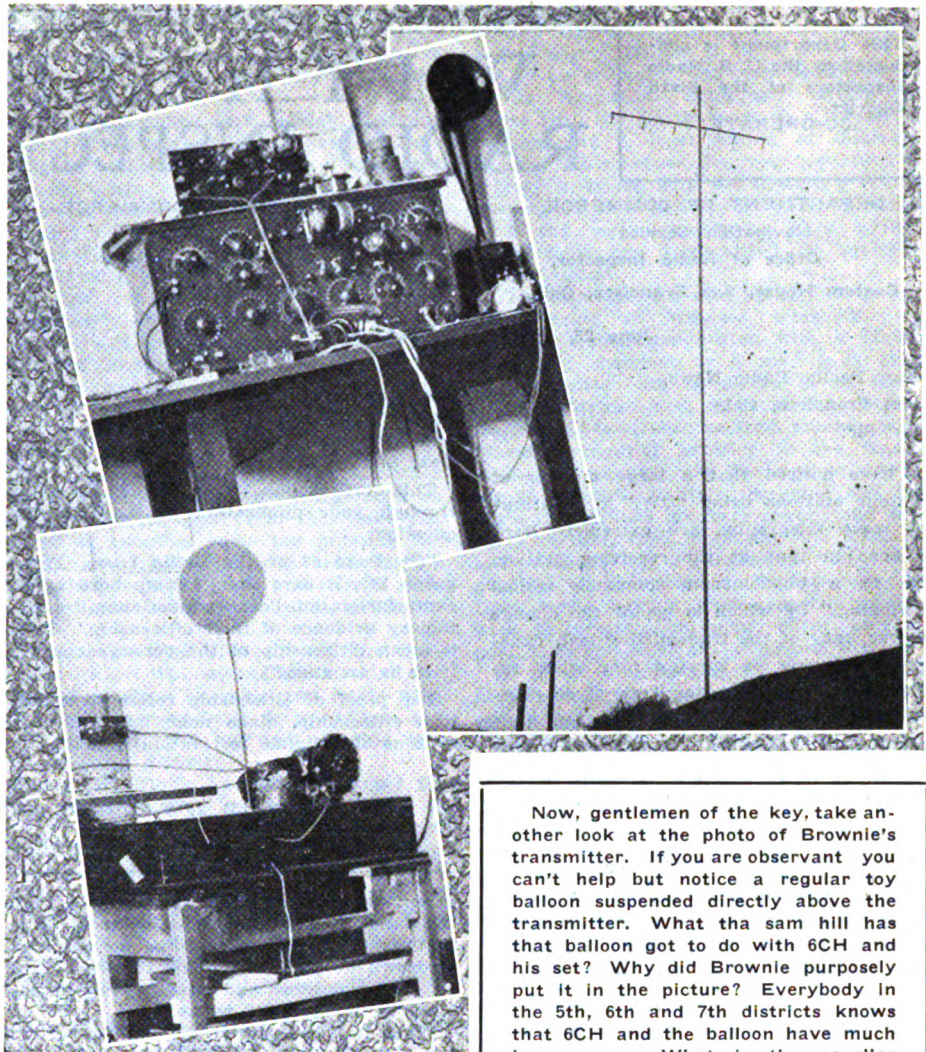
YOU can't expect to get results from your set unless you 'stick with the ship', and it is a mighty rare occurrence that luck will bring results."—6CH.

BROWNIE, as we all know him, is the proud owner of station 6CH. Why shouldn't he carry around that contented smile of his when he has the distinction of working fourteen "seven" stations the first night that he busted into the air with his 1-2 K. W. transmitter.

"If every Western amateur would play the game as squarely as 6CH," remarked a certain individual, "all would be well."

Brownie thinks nothing of standing by for three hours to give the other fellow a chance. And everybody in the West knows how things begin to move when 6CH gets started.

His radio experimenting dates back to 1914 and he has ever insisted on having one of the highest "sticks" in town. Take a look at the photo of his present mast. It is 103 feet high, while another mast, 35 feet high, suspends the other end of his six-wire aerial. The aerial is 78 feet in length; lead-in is 17 feet long, and the ground is 20 feet from his apparatus. Now, then, observe the transmitter. Everything neatly arranged—no efficiency lost, strayed or stolen. No wonder he has been heard by the following stations: Fifty stations in the seventh district, from Portland to Moscow, Idaho; Salt Lake City, Utah; Southern California, and has also worked stations in Arizona and New Mexico. His radiation is just a little under three and three-quarters amperes. Reno, Nevada, and Los Angeles have been worked between 5 and 6 P. M. Usually the station is not in operation until after 10 P. M., as 6CH has always been known as a "night owl"—being a moving picture operator. The transformer is of his own construction. It is of



the closed core type with a 24,000 volt secondary. A Murdock oscillation transformer, 6-point rotary running at a speed of 3450 R. P. M., glass plate condenser of 0.006 M. F. capacity and an aerial ammeter constitutes the transmitting equipment.

His receiving apparatus is also home-made. Specially constructed honeycomb coils are used for the tuner. With this receiving set he has heard 5ZA, 6ZA, 7CC or ZM, 9UE, 9WU, 9EE, 9UV, 9AG, 8UE and others too numerous to mention. A Magnavox is used to throw the signals from the seventh district stations all over the house, using only two steps of amplification.

Now, gentlemen of the key, take another look at the photo of Brownie's transmitter. If you are observant you can't help but notice a regular toy balloon suspended directly above the transmitter. What the sam hill has that balloon got to do with 6CH and his set? Why did Brownie purposely put it in the picture? Everybody in the 5th, 6th and 7th districts knows that 6CH and the balloon have much in common. What is the peculiar relation of one to the other? Out with it, fellows!! The editor of the "PRN" has five crisp one dollar bills that he is going to give to five of us amateurs who send in the best answers to the above question. You don't have to be a subscriber to enter the race. Get busy now—shoot in your answers and win a dollar. The names of the winners, as well as their answers to the big balloon mystery question, will appear in the next issue of the "PRN." The judges of the contest will be five prominent local radio men. All answers must be of no more than 50 words in length. Let's go!

CORRESPONDENCE FROM OUR READERS

SAN JOAQUIN LIGHT & POWER CORPORATION
General Office

Fresno, California

June 26, 1921.

Mr. P. R. Fenner,
50 Main Street,
San Francisco, Cal.

Dear Mr. Fenner:

I cannot refrain from writing my appreciation of your Radiatorial, in the July issue of PRN, on correct sending. You certainly said a mouthful, and voice my views precisely. Isn't it the truth, though, that a great many fellows have no sense of time intervals, likewise with a lot of

amateur musicians. The way some of these DX operators rush through with their msgs, one would think that it was a life and death matter, only to have to ask for repeats and in that way cause considerable unnecessary interference. I have always held that amateur operators should have to send up to some standard, before being permitted a license. That would work a hardship on Radio Inspectors, most likely; but would, without any doubt, have the desired effect on code sending.

I have had fellows come to me for code tests and complain that they could not read my sending because it was too precise and machine-like. The trouble was that they were used to slipshod, careless sending and I tell them, what a small chance they would have in passing the

Inspector's Omnigraph code test. While I have preached my ideas of good sending to the local amateurs, only to have it go inot one ear and out the other, it certainly gives me a lot of satisfaction to have a professional come out as you have done and take them to task. With very best wishes, I am, as ever,

Your friend,
(Signed) R. C. DENNY, 6CS.

The Formica Insulation Co. have recently appointed the Northwest Radio Service Co., 609 Fourth Ave., Seattle, the exclusive Northwest distributors for Formica sheet and tubing. This company has recently installed machinery for cutting Formica panels to any desired size.

This Department is conducted by the U. S. Radio Inspectors of the Sixth District.
CO-OPERATE!

WITH THE RADIO INSPECTOR

Questions answered by the Inspector.
No names will be printed.
Initial your letters only.

DEPARTMENT OF COMMERCE
Navigation Service
Office of Radio Inspector,
Custom House, San Francisco, Cal.,

June 26, 1921.

Editor Pacific Radio News,
San Francisco, Cal.
Dear Sir:

I have noticed that a large number of amateur stations using "CW," or continuous wave telegraphy, are extremely hard to keep in tune at the receiving station, due to a phenomenon commonly called "swinging," by which is meant the change in frequency of the transmitting test, causing a swinging or varying tone when received on a receiver using heterodyne principles. This often is so troublesome that reception is impossible at times, due to the inability of the receiving operator to follow the variations of the wave of the transmitting station.

A very common and prolific cause of this troublesome occurrence is due to the actual swing of the transmitting antenna itself. When a set is tuned, say with the antenna at rest (there being no wind to move it) it will have a definite capacity. Now, if a wind comes up, and swings the spreaders of the antenna, in such a manner that they approach nearer the earth at times (although this might be only a few inches) a great difference in the received "beat note" will be observed. This is due to the slight variations in the antenna capacity, due to the swinging, which will cause the note to vary. This can be readily eliminated by building the antenna in such a manner that it will not swing—using "downhauls" on the ends of the spreaders to keep them steady, etc. The lead-in wires should also be drawn tight, and not allowed to swing, as is common practice.

Overloaded DC plate supply generators will often cause swinging, in some circuits, also. When the circuit is loaded, the DC generator will have a certain potential. Now, when the key is opened (using pure CW telegraph) the generator will speed up due to there being less or no load. This will cause a rise in voltage, which, in turn, will result in a higher voltage being impressed on the transmitting circuit when the key is again closed. The greater voltage will cause a change in the radiated wave, due to everything in the set being at a higher potential, which will result in a variation of the note in the receiving equipment. This change is slight, it is true, but will be enough to cause a considerable change in the "beat note" at the receiver. This may be eliminated to a large

DEPARTMENT OF COMMERCE
Navigation Service
Office of Radio Inspector
Custom House
San Francisco, Cal.

June 21, 1921

The Editor,
Pacific Radio News,
San Francisco, Cal.
Dear Sir:

This office has been asked to reply through your publication to the following question:

"On Page 66 of the Radio Laws, Paragraph 149, it says that 'foreign born applicants for station licenses must submit satisfactory evidence of their citizenship.' Does it mean citizenship of the person's country if he is an alien?"

The proof of citizenship refers to American citizenship, since none but American citizens are eligible for station licenses.

Respectfully,
(Signed) J. F. DILLON,
Radio Inspector.

extent by shunting the key with a high resistance, which should be of such value that about 25 per cent of the normal load is drawn at all times. This throws a load on the generator, and prevents an excessive rise in potential on no load.

When it is considered that on 200 meters the frequency of the oscillations is one and a half MILLION cycles, and that a change of one meter will make a change of 5,000 cycles, a very slight change will be enough to cause such a large variation of the actual frequency, that the beat note at the receiver is lost. Say you are radiating on 200 meters. Now, if the antenna swings a little, and changes the wave by a tenth of a meter (which is far beyond the reading of an ordinary wave meter), the beat note will have changed by 500 cycles, and the beat note will be absolutely lost. A much smaller change than this will usually be sufficient to set up unreadable swinging in the receiver.

Respectfully,
(Signed) D. B. MCGOWN.

QUESTIONS AND ANSWERS

Q. Please answer through the "Pacific Radio News" whether or not it is permissible for amateurs to converse on anti-prohibition matters via radio. I have heard several amateurs converse freely on this subject and, being a firm believer in prohibition, I would like to have your opinion on the subject. It is lawful to discuss this matter by radio to such an extent that a joking matter can be made of a pre-night's "overflowing bowl" party? I have also heard amateurs invite others to their station to "have a drink."

S. L., Berkeley.

Ans. No limitation is made under the laws and regulations concerning the matter transmitted via radio, provided it does not conflict with law and order. The only

definite regulations covering the above case is Paragraph 210: "No person shall transmit or make a signal containing profane or obscene words or language." It is not believed that any discussion of the kind mentioned above could be classed under this head, unless actually the operators did swear over the apparatus. A good deal of this matter is sent over the air just to act "smart," and is in most cases just mere bravado, and naturally cannot be subject to censure, unless the said operation causes interference with other communication, in which case the stations and operators would be guilty of unnecessary interference, for which they could be penalized.

Q. How long can two stations hold the air without fear of suspension of the station license? Can two stations communicate with each other for a whole hour without even waiting to hear if somebody else wants the air? If two amateurs are talking together for a long time and I want to send, are they required to stop and give someone else a chance?

C. S., San Francisco.

Ans. This depends on the class of traffic being handled, and the needs of the individual case. If the long-continued use of the air is necessary, as handling legitimate traffic, etc., while the person waiting is simply desirous of "chewing the rag," the former stations should have priority. It is the purpose of the Department that everyone should obtain the maximum benefit from the operation of their stations, hence stations unmercifully "hogging" the air are clearly guilty of violations of the laws and regulations concerning the transmission of superfluous signals, and of interference. If the stations are located in a district where traffic schedules are in effect, any unnecessary communication during the long-distance periods will be considered as willful interference, and the violators treated accordingly. It is probable that the case referred to in your question, the interference caused by the stations mentioned was due to the use of excessive power for short distance work—another violation of the laws and regulations.

Q. Under the new license provisions for commercial gradings, what grade of license would I receive upon expiration of my present commercial license, which has been used only in operating an amateur station during the past two years?

A. E., Oakland.

Ans. If you have not had any commercial experience you will be examined for commercial First Class Third Grade. If you have had the necessary experience (at any time, whether on the last license held or not) for a First Class Second Grade you may be issued a license of that grade. If you can copy 25 words per minute, you may be issued a First Class First Grade License, also provided that you have had the required experience for this grade. The issuance of all these licenses will, of course, depend on whether or not you successfully pass the code tests and written examinations. The operation of an amateur station does not entitle the holder of a commercial license to renewal, except by re-examination.

CONTINUOUS WAVE MATTERS

By Lawrence Mott
(Associate Editor)

Progress along all lines of endeavor that are distinctly new, is, of a necessity, somewhat slow. I have, however, been pleasantly surprised at the interest shown in CW by many operators.

There is a well-known amateur in the Southland, with a "Z" license, who is most enthusiastic, and an energetic booster. From him I have received some very excellent suggestions for CW work, and I take a great degree of pleasure in herewith reproducing parts of his missive, withholding his name only because of his especial request to this effect. Such modesty on the part of an eminently successful operator deserves a place in the spotlight of amateur radio!!

His letter follows:

"* * * * I have a suggestion to make. QRN is with us, arcs annoying many stations, and there is always the QRM to contend with. I would ask that you form some scheme for the CW stations to work on schedule, assigning each station a certain, definite time for broadcasting CW messages, preferably normal traffic, but if there is none such to transact, then a QSU or a short QST.

Now let us see how this would work out. A general plan being devised by you, the calling time for CW might begin at 9 P. M. and one might then listen in and hope to hear stations using CW as follows:

9:00 P. M. 6AAD, QST and traffic.
9:10 P. M. 6EN
9:20 P. M. 6LY
9:30 P. M. 6ALE
9:40 P. M. 6ZB
9:50 P. M. 6HU, etc.

Adding to this proposed list, times for other CW men who might wish to join us. Do you think that we might get somewhere in this way? A plan could be worked out, especially during the summer months, for the putting over of traffic in the hands of certain CW stations, and then interesting 6ZZ, 6ZA and others beyond the dead spot, to pick up Eastern traffic on CW, much as 2ZL broadcasts at 9:30, 10:30 and 11:30 P. M., getting QSL's by mail later. (See "QST" for April, 1920, Ppg. 13.) At least something can be probably worked out by you whereby the efforts of CW will be coordinated! Even the Government stations are all on a schedule and it seems to me that an informal CW schedule might promise gratifying results. * * * *

I am forcibly and favorably impressed by the practical usefulness of these suggestions and I would earnestly ask CW men to "line up" and get going.

Some CW operators have given me their names and station details, but not enough to make a really good showing. Why not seriously consider Mr. —'s ideas, and from the date of the appearance of this number of PRN, begin a schedule exactly as proposed in the communication that I have reproduced? Can we CW men but once let it be thoroughly understood that AT certain hours and minutes there is some CW set operating there would be much more listening-in!

The fact that CW will successfully handle traffic through QRN and QRM that would effectually "kill" spark results, is too well known to require wearying explanations on my part.

Personally speaking, 6XAD will, from July 28th, be working and listening each night from 9 to 10 P. M. The waves will be 200, 240 and 375, varying them until I

can ascertain which is the more easily found and read. I rather think that the 240 will do the trick, although there are so many "broad" (!!) spark stations within 75 miles of Avalon that QRM may render the 240 wave impossible!

It is a self-evident fact, I think, that until such a time as we CW enthusiasts have a regular schedule, and abide by it, one with the other, nothing of any great satisfaction or value will be accomplished, and it seems a great pity to lackadaisically let matters "slide" in haphazard fashion, picking up CW when one "happens" across a CW note, but otherwise doing nothing systematically!

Mr. —'s pointed remark, to the effect that the Government Stations are all on schedule, meaning, I take it, the more powerful arcs—should indubitably prove that a schedule is the only means of reliable results.

Will 6EN, 6IY, 6ZB, 6HU, and all other CW men, get in touch with me as soon as they conveniently can? Will they take the trouble of choosing some ten minutes between 9 and 11:30 P. M., in order that I may publish a list of these and rely on such operators to be "present" when called on the air?

As it is too long to wait until the September PRN I will assume the work of intercommunicating by radio and letter with all CW men who will forward me the times that they will be "on." In this way we can begin SOON!

Must CW dribble pathetically along? Or shall we, by a little co-operation, show it up for that which it really is—the most efficient and up-to-date method of radio communication!

I do not wish to be thought a "nag" or a nuisance, but it IS a pity to permit Opportunity to slip by, night after night, making no attempt even at profiting by it!!

"Time and tide" (and radio!) "wait for no man!"

Paraphrasing the famous poem:
"Let us now be up and doing,
With a heart for any fate—
Still a-listening and a-working—
Learn to tune around and wait!"

Turn to Page 21 for Schedule of C. W. Traffic

INTERRUPTERS IN VACUUM FOR MODULATION IN TRANSMISSION AND RECEPTION

By
Frank E. Summers, A. M. I. R. E.

WITH the increased use of undamped by amateurs, professionals and for waves for telegraphy and telephony commercial purposes, improvements are needed that will increase the efficiency of modulation in transmitting or receiving.

To obtain this end, I believe interrupters in vacuum will be used to a great extent in the near future. My study and research tends to prove that the air is a good conductor for electricity in wireless frequencies. To my knowledge, all CW interrupters at present are used in the open air. Why not place these interrupters in a vacuum for modulation. A vacuum will offer probably more resistance to the conduction of electricity in wireless frequencies than any other known medium.

If a Goldschmidt tone wheel is placed in a highly evacuated container, and connected in the transmitting antennae circuit, then CW could be cut up at the rate of 1000 times per second or more. This would give a musical sound in a telephone receiver when used with any damped wave detector. Could also better be distinguished from static, as any method that will cut

up undamped waves after reception will also probably cut up static. This method gives very abrupt modulation and messages should carry further.

Also an ordinary relay can be used in a highly evacuated container, having in series with the electro-magnets a buzzer or howler, and a local source of electrical energy. This causes the relay armature to vibrate in phase with the armature of the buzzer, the antennae circuit being in series with the relay armature. Very abrupt modulations are transmitted to the antennae circuit.

This principle can also be applied to the transmission of wireless telephony, by using a transmitter button with a highly evacuated chamber, or a solid back type of transmitter can be placed in an evacuated container and operated by electromagnetic means, such as from another telephone transmitter exterior to the transmitter in vacuum. By this method sparking to a great extent is prevented and the voice modulations are very abrupt and will carry further, thus increasing the distance and audibility of transmission. In using granules for a microphone for low voltages, they should have a high dielectric power, such as bismuth, antimony, silver, carbon, gold, thallium, selenium, tellurium, etc.

In using a microphone for modulation of high frequency currents direct, the granules should have a high fusing value, such as tungsten, tantalum, osmium, iridium, etc. Here, probably, the dielectric power is not of much value.

The vacuum transmitter can be used for either modulating low voltage direct currents or for electric currents of a radio-frequency.

The electrodes in the Goldschmidt tone wheel and relay buzzer should be of a non-electron emitting substance, as far as practical, as substances that emit electrons easily in a liquid, vacuum or gas should not be used, as they would tend to cause sparking even in a vacuum. Electrodes of platinum, platinum-iridium or other similar non-electron emitting substances should be used. The contacts on the tone wheel should be spaced quite a distance apart, to prevent arcing. Also an exterior grounded spark gap should be used to ground the current when tone wheel breaks the aerial circuit.

But when it comes to the best substances to use in microphones as electrodes and granular material we have other laws to follow. I have seemingly discovered why carbon is the most efficient substance to use in microphones when modulating a low voltage current, namely, because of its RELATIVE HIGH RESISTANCE, FUSING AND DIELECTRIC POWER. But when it is desired to use a microphone direct to modulate radio frequencies, then carbon is not a desirable element to use, because it easily emits carbon vapor or electrons, as a transmitter made up with electrodes and granules having a relative high dielectric and non-electron emitting power should give better results, whether in a vacuum or not. I have also discovered that the difference of the resistance of carbon and metals to the conductivity of electricity having a radio-frequency IS VERY LITTLE, IF ANY. In modulating radio-frequencies carbon loses its value as having a relative high resistance. Substances having a high dielectric, fusing and non-electron emitting power disposed in a vacuum should be most efficient. A vacuum will also prevent oxidization of electrodes and granules.

Of course, when interrupters are disposed in a vacuum the heat generated cannot be so easily radiated, but practical art-

HOW "B" BATTERIES ARE CONSTRUCTED

RECENT increased growth in the use and range of wireless telegraph and wireless telephone equipment is centering the attention of both professional and amateur operators on the mechanics of their outfits. Certain results are secured by amateur operators who are not technically skilled in the whys and wherefores of their equipment, but it is conceded that the normal and above normal results are procured by those who are fully and completely conversant with every mechanical detail of the outfit. Signal success in their wireless telegraph and wireless telephone operation depends upon much more than a mere speaking acquaintanceship with dots and dashes. The best equipment obtainable is none too good, for the greatest results are obtained by harmonious welding of equipment with the human element of control.

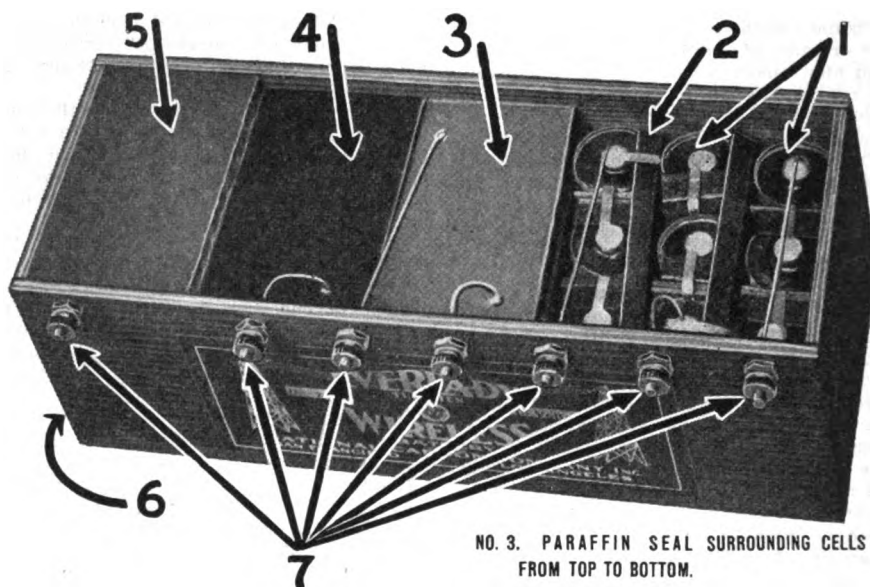
It would be highly advisable if every wireless operator could study first-hand in the factories the actual manufacture of each particular element used in his outfit. Such an opportunity would unquestionably give every operator a broader vision and make him better able to secure the best obtainable results in actual operation. But, since this is neither possible nor practicable, it behooves every operator to learn as much as he possibly can about the actual manufacture of his equipment. Most manufacturers are always glad of the opportunity to explain the methods employed in creating any of their products.

It was entirely natural that the National Carbon Company, Inc., should engage in the manufacture of both dry batteries and wet batteries for wireless telegraph and wireless telephone uses. Having been one of the pioneers in the manufacture of these two types of batteries, it required only an adaptation of their principles to the needs and requirements of this class of equipment.

An exhaustive study of the battery needs of the wireless telegraph and telephone was made, covering a period of some two years.

In the construction of Eveready batteries the manufacturers believe that they have developed a plan of interior construction that possesses many advantages, particularly as applied to those who are concerned in radio activities, either for pleasure or profit. Because of superior insulation these batteries are demonstrating remarkable ability under a wide range of climatic conditions and variations in temperatures. The importance of this particular feature of Eveready batteries is apparent to all, but more so to those who have wrestled with equipment in far-away and inaccessible places.

Construction of the No. 774 Eveready B Battery is shown in the accompanying illustration. The same general principles are followed in the manufacture of all Eveready Dry batteries for radio equipment. A study of their construction will show the extent to which the manufacturers go in securing complete insulation which extends all the way through the battery from the insulating partition separating individual cells to the paraffine impregnated container, making of the whole a unit impervious to moisture.



NO. 1. ASSEMBLY OF CELL UNITS SEALED AND CONNECTED IN SERIES.

NO. 2. INSULATING PARTITION OF SEPARATE CELLS AND CONNECTIONS.

NO. 3. PARAFFIN SEAL SURROUNDING CELLS FROM TOP TO BOTTOM.

NO. 4. INSULATING BOARD.

NO. 5. TOP SEAL OF HARD WAX.

NO. 6. PARAFFIN IMPREGNATED CONTAINER.

NO. 7. TERMINAL TAPS FOR VARIOUS VOLTAGES.

This is a 48 volt battery particularly well suited to a wide range of wireless uses. It is made up of 27 cells connected in series and allows a range of 18 to 48 volts in steps of $4\frac{1}{2}$ volts. One negative and 6 positive terminals have heavy brass screws and nuts.

No. 766 B Battery contains 15 cells connected in series solidly packed and sealed in paraffine, the top with half an inch of sealing wax rendering the unit absolutely waterproof and able to withstand all climatic variations. It has 1 positive and 1 negative lead and $22\frac{1}{2}$ voltage. This battery has been standardized for use in the United States Navy.

No. 765B Battery is very similar to No. 766, but is made particularly for the use of beginners and those who are mostly experimenting with wireless outfits. It contains 15 cells connected in series and has a voltage of $22\frac{1}{2}$ with 1 negative and 1 positive terminal.

In the No. 746 the public is offered a battery that will produce remarkable amplification. It consists of 72 cells connected in series and delivers 108 volts. It can be used in connection with any of the other Eveready Dry batteries and will greatly increase the radius of either the wireless telegraph or wireless telephone equipment. Although a comparatively new battery, it is being widely and successfully used.

But little need be said with reference to the use of the storage battery, as it is the heart of the wireless equipment as it is the heart of the automobile. The storage battery supplies the current for the filament for the transmitting and receiving tubes and for relays and auxiliary purposes. For

these uses the Eveready No. 6-1G-60 is recommended.

All Eveready batteries are manufactured in the immense plant of the National Carbon Company at San Francisco. There is an advantage in using batteries that are manufactured on this Coast, as the user is generally assured of a fresh battery and one that has not been stored for any length of time or possibly subjected to damage in the long shipment across the continent. It is also a source of rightful pride that the Pacific Coast is now producing a superior quality of batteries and emphasizes the fact that this portion of this great country is rapidly coming to the front as a manufacturing center of great importance and unusual promise.

—Not Advt.

R. H. McMANN TO HEAD RADIO DEPARTMENT OF FEDERAL TEL. & TEL. CO.

RENVILLE H. McMANN of New York City, who is a member of the Executive Radio Council of the Second District and Secretary of the Radio Club of America, has been appointed manager of the Radio Department of the Federal Telephone and Telegraph Company of Buffalo.

Mr. McMann has been interested in amateur radio for the past twelve years and has had a broad experience in the art from the viewpoint of the amateur.

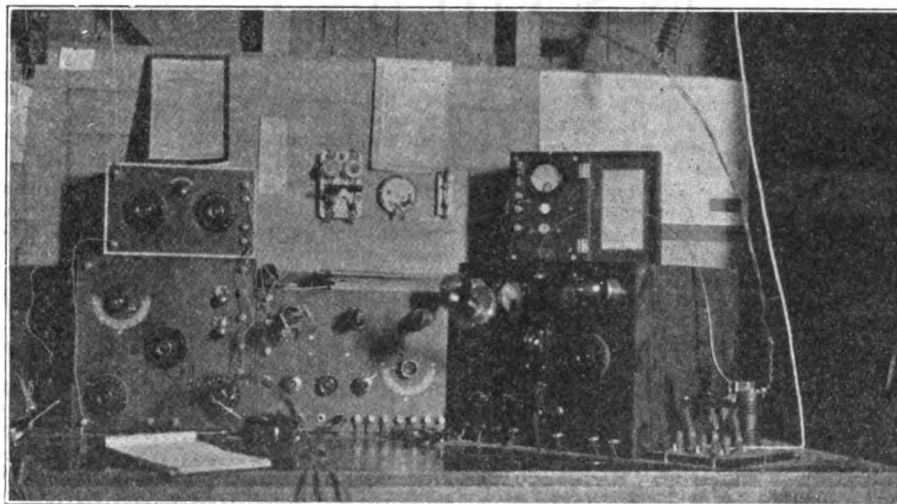
During the war he was in charge of radio telephony on the destroyer U. S. S. "Herresoff" and also for three months had charge of the installation and maintenance of radio telephony at the U. S. Naval Air Station, Cocosolo, Canal Zone.

—Not Advt.

"PROFESSIONAL AMATEUR" STATIONS

6ALU—LOS ANGELES, CAL.

MR. R. P. MACKENZIE is a firm believer in CW and radio telephone transmission. The accompanying photograph of his station shows something quite out of the ordinary. Considering that the radiation of the phone set, if only half an ampere on 195 meters, it will be of interest to all to learn that 6ALU's voice has been heard by 6AGF and 6ZX. Two power tubes of 5 watt capacity are used, one in the modulating and the other in the oscillating circuit. The plate potential is 375 volts and the tubes draw in the neighborhood of 40 milliamperes. 6ALU is at a loss to understand why he has not received any cards from amateurs north of Sacramento, Cal. Has anybody heard him in that part of the state? If so, he would like to have you tell him. The receiving set is of the regenerative type, constructed along the lines of the Grebe CR5 tuner. Mr. Mackenzie is treasurer of the Southern California Radio Association, the largest and most progressive radio club in the southern part of the state.

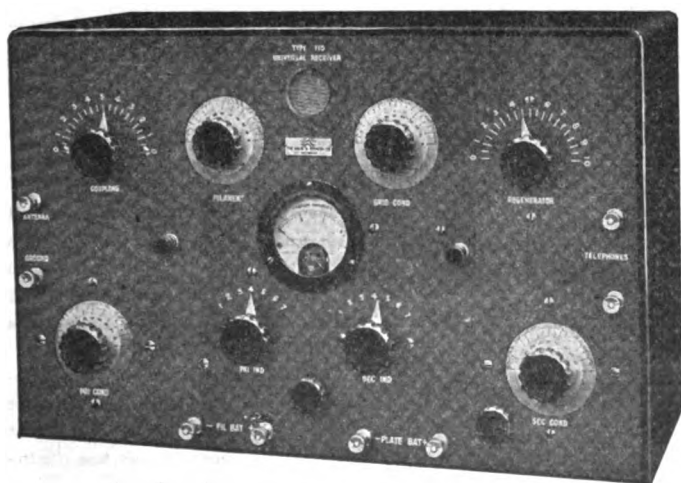


6ZX-FRESNO, CAL.

HERE we have 6ZX of Walnut Grove, Cal., owned and operated by Mr. J. V. Wise. This is a special amateur station and operates on 375 meters. Mr. Wise sent us the accompanying photo of his station house and aerial and we will now take our readers into our confidence and tell them what's inside of the little white house, although nothing is visible in the photo except the smoke stack. The station house is 8 feet wide and 12 feet long. The transmitter (inside of the house) is adjusted to two wave lengths—200 and 375 meters. The receiving equipment consists of Turney Spider-Web inductances, Clapp-Eastham condensers, Brandes Navy Type phones and a one-stage amplifier. The antennae to the left of the photo is supported by a 22-foot "V" pole on top of a

35-foot building. This is the antennae used for 200 meter transmission. The high antennae to the right is supported by a tree, whose shadow is seen in the foreground. This antennae is used for 375 meter spark work and also for receiving purposes. The levee in the rear of the station house is the S. P. company's railroad track bed and a power line of 5000 volts is carried on the poles shown in the background. Half way up the picture you can see a set of telephone wires. 6ZX says that his station will never win a popularity contest prize from the phone company. The antennae passes over these wires.

The photo shown herewith was taken from the top of a levee, 100 feet from the station house. This levee is used to keep the Sacramento River from overflowing. 6ZX is located half way between Sacramento and Stockton and Mr. Wise states that he gets more than his share of QRM.



Photograph Courtesy of Colin B. Kennedy

A UNIVERSAL REGENERATIVE RECEIVER

SPECIALY CONSTRUCTED to detect, regenerate and oscillate on all wavelengths in common use, the receiver shown in the accompanying half-tone is a valuable asset to radio of today. It embodies a self-contained audion control unit, specially constructed automatic plate adjusting device which is controlled by the secondary tuning, gear actuated micrometer secondary adjustment, and other entirely novel features.

The receiver will regenerate freely from wavelengths as low as 175 and as high as 25,000 meters. Large balanced condensers are used for primary and secondary tuning. The inductances are bank-wound and made moisture-proof throughout. A Weston ammeter is provided to indicate the filament current consumption and special potentiometer is used for finely adjusting the plate voltage. This potentiometer is connected between the terminals of the filament battery. The complete receiver is mounted in a walnut cabinet, provided with hinges, to allow interior inspection.

—Not Advt.

2QR AGAIN HEARD IN SCOTLAND

RADIO STATION 2QR, owned and operated by Hugh and Harold Robinson at 13 Walnut street, Keyport, N. J., has just received word that their radio phone had again been heard in Aberdeen, Scotland, and also by a ship's operator in port at Tela, Honduras. The following letter from Mr. James Miller of Aberdeen, Scotland, tells of their again hearing 2QR, which makes a total of four (4) times that letters have been received from Scotland to this effect.

Copy of Letter Received by Station 2QR,
Mr. Hugh Robinson, No. 13, Walnut
Street, Keyport, N. J.

April 5, 1921.

Dear Mr. Robinson:

I have just received your letter and owing to my removing from Mile-End avenue it was delayed. The other letter you sent in January came when I was ill. I sent a letter in reply to that one which you don't seem to have received. I GOT YOU SEVERAL TIMES IN JANUARY AND AT THE BEGINNING OF FEBRUARY, but I had to take my set down and I haven't done anything more at it since, as I am taking the chance to improve it. I'll be ready in about a month to check you up again. I expect I'll hear you much better now and I hope to check you up without any mistakes. I HEARD YOU EVERY TIME LISTENED IN FOR YOU before I took down my set. The only thing was that my tuning was not very selective and other stations jammed me. However, I am improving that and I hope to hear you clearer. You are quite as good on the 275 meter wave as you were on the 600 wave. I'll send the details of your transmissions in a short time, as I haven't my notes here just now, also details of my set and photographs. I have only used three valves during the whole time and my aerial is 80 ft. long double, 40 ft. high, but I'll send you the whole details next mail, and also when I'll be ready to start again. I HOPE TO USE A LOUD SPEAKER AND LET A COMPANY HEAR YOU. I don't know if I'll manage, but I'll try and if I succeed then that will knock the experts' freak theory on the head. I am using an entirely new type of valve, an idea of my own, and I suppose that is the reason of the remarkable results. I WOULD LIKE TO SAY THAT YOUR TRANSMISSIONS ARE REALLY REMARKABLY GOOD. YOUR MODULATIONS ARE EXTREMELY CLEAR. THE CARRIER WAVE IS REALLY THE WEAKEST IN COMPARISON TO THE SPEECH THAT I HAVE HEARD. YOU REALLY GET REMARKABLE RESULTS. I am writing this on the train, so I hope you will be able to make it out, but I want it to catch this mail so as to let you have it as soon as possible.

Hoping to hear from you soon, and also hope to hear you speaking.

I remain, yours sincerely,

(Signed) JAMES MILLER.

Please note change of address.

Care Mrs. Barnett, 48 Albury Road, Aberdeen, Scotland.

It will be noticed that Mr. Miller states he expects to use a loud speaking horn in further tests, which indicates he is receiving 2QR very clearly. This will also allow witnesses to actually verify his reception of 2QR'S transmission.

Further details from the ship's operator who heard 2QR'S radio phone while in port at Tela, Honduras, are now on the way and he has advised that both voice and music were received very clearly.

Other record-breaking distances as given by radio stations in twenty-one states, Canada, and at sea, are given in the following list:

Radio Stations Who Have Heard Station 2QR Radio Phone Working

Cities—	Miles
Bolivar, N. Y.	350
Bristol, Conn.	110
Buffalo, N. Y.	400
Ashland, Ohio	650
Dover, Ohio	650
Napanee, Ontario	400
Mokane, Mo.	1,200
Peterculter, Scotland	3,500
Burlington, Vt.	300
Chelmsford Center, Mass.	225
York, Neb.	1,400
Elmira, N. Y.	250
Jamestown, N. Y.	500
Utica, N. Y.	300
Southbridge, Mass.	190
Shamokin, Pa.	190
Olean, N. Y.	340
Monessen, Pa.	450
St. Louis, Mo.	1,052
Rockville, Ind.	862
Dunmore, Pa.	132
Canton, Ill.	975
Twin Lakes, Conn.	108
Bangor, Maine	570
Niagara Falls, N. Y.	380
Old Forge, N. Y.	185
Kalamazoo, Mich.	815
Fargo, N. D.	1,650
Williamstown, Mass.	180
Syracuse, N. Y.	275
Elizabeth City, N. C.	450
Youngstown, Ohio	600
Geneva, Ohio	530
Boone, Iowa	1,245
Kitchener, Ontario	600
Condersport, Pa.	400
Connellsville, Pa.	415
Niles, Ohio	500
Niagara Falls, Ontario	400
Hagerstown, Md.	130
Washington, Pa.	425
New London, Ohio	630
Penacook, N. H.	225
Leominster, Mass.	240
Manchester, N. H.	225
Cleveland, Ohio	550
Salem, Ohio	500
Flint, Mich.	650
Pittsburg, Pa.	425
Houma, La.	1,250
Detroit, Mich.	700
Canton, Ohio	540
Guelph, Ontario	450
Wilmington, N. C.	645
Boston, Mass.	250
Steamship Kansas	1,500
Blackstone, Va.	300
Casey, Ill.	925
Wadesboro, N. C.	465
Fort Wayne, Ind.	760
Rochester, N. Y.	450
Nashua, N. H.	300
Franklin, Pa.	400
Richmond, Ky.	725
Rock Island, Ill.	1,100
Farmington, Mass.	250
Wilmington, Del.	125

By States—

New York	Maine
Connecticut	Michigan
Ohio	North Dakota
Missouri	North Carolina
Vermont	Iowa
Massachusetts	Maryland
Nebraska	New Hampshire
Pennsylvania	Louisiana
Indiana	Virginia
Illinois	Kentucky
	New Jersey

Also Canada, Scotland (Peterculter), Honduras (Tela), on Atlantic Ocean (1,500 miles).

Practically all of these distances are records which have never before been equaled by any radio phone of the small size and power used by 2QR, and many of the distances exceed those made by even the most powerful radio phone outfits in the United States.

It is interesting to note that Mr. Robinson's radio phone uses only four (4) five watt transmitting tubes, which are the smallest made, and takes its power from an ordinary light socket using less current than an ordinary electric lamp. The whole outfit weighs less than seventy-five pounds and takes up a space approximately the size of that required for an ordinary typewriter.

These recent letters practically remove all doubt as to the genuineness of 2QR being heard in Scotland and the letters from other stations at various distances over 1,200 to 2,900 miles give further evidence to the fact that Mr. Robinson's radio phone is actually reaching remarkable and hitherto considered impossible distances considering the smallness of his outfit.

Mr. Robinson is carrying on his experiments with a view of being heard in every state in the Union, and judging from the above results, this will not be long.

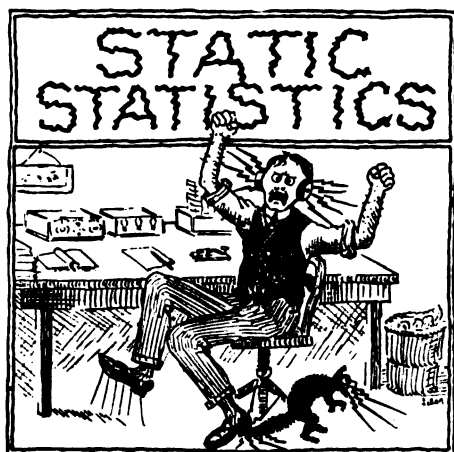
VACUUM TUBES PROTECTED WITH NEW DEVICE

THE painful experience of burning out vacuum tubes is eliminated by a new protective device, the RADECO SAFETY FUSE, recently placed on the market. Several of these new type fuses were received by the publishers of "Pacific Radio News" and were given the usual laboratory test. It was impossible to burn out a tube fitted with the new protective device. The fuses are made in several sizes, varying in ampere carrying capacity according to the type of tube in use. The smallest size will blow when more than three-quarters ampere is drawn by the tube. Other sizes will carry 1, 1½, 1¾, 2 and 2½ amperes, respectively.

A novel feature of the fuse is the method employed to adapt it to the tube base itself. The little fuses slip directly into the prongs of the vacuum tube base and thereby an external method of fusing the filament circuit is made unnecessary.

The Radio Equipment Company of Boston, Mass., deserves the congratulations of all tube users in giving them a device that will save a goodly portion of the "running expenses" of a radio station.

—Advt.



By Squawk McGuff

There has been much discussion as to low and high notes, namely, as to breaking through the QRN of the summer months. The writer finds that during his long distance work that the high note is the most steady and much easier to pick out through the infernal cracking of Jupe Pluvius. From the south, 6EA comes roaring in with a high pitched note that sounds like a piccolo with the croup. 6KP has a low note and comes in very good, it is true, but the fading is very bad and at times he goes clear out, while the high note remains more steady. But I will say that while on his peak 6KP knocks 'em for a row of sliced navy beans. From the north we



Squawk McGuff

have 7DA with a falsetto, or high note (c sharp). He is practically the only "seven" that makes noise to 6APH. Of course we hear other seven stations but like 6KP they can't stand up under the terrific onslaught of Jack Dempsey Static.

Now, boys, I do not wish to enter into controversy over this problem. You have my version of the thing as I see it. Just put it down for what you think it's worth and let it go at that.

Following is a list compiled by 6APH of stations worked during the Static Season. Quite a little fete in itself:

(6LC) (6DD) (6QR) (6AV) (6EN) (6DP) (6OW) (6ZU) (6ZX) (6OH) (6KM) (7YA) (7DA) (6ADL) (6KA) (6FH) (6ACR) (6ZC) (6GP) (6ZA) 7RX (7HN) 6FT (6IC) (6KS) 7ZM (6HH) 7ZA (7DJ) (7HF) (6IM) (6AY) (6WH) (6KP) (6DS) (6IY)

Loudest and most steady DX stations heard are: 6EA, 7DA, 6KP and 7YA.

I run across Engineer McNamee of the Moorhead Company. His brainy brow was wrinkled. He appeared in the throes of the utmost dejection.

"Whassamatahyou, Mac?" says I. "Burn out another fifty watt tube?"

"Well, not exactly, but someone has been reporting our concerts nightly by telephone until he has about got my angorical goat-ania." (Them's big words like engineers use. I don't know what they mean myself.)

"Well, that's strange. Very strange, indeed," says I (making off as how I am a collegiate graduate and understand big words).

"Yes, you see this unsolicited categorical son of a bifurcated parallelopipigon has been undermining his rhomboidal cranial stuffing with a concatenated collection of crystallized zirconium, which is to say, he has been extemporaneously improvising bum connections on a galena detector. What he needs is a good big fat dose of hexamethylenetetramine. If I had a chance I'd soak him myself with

a slug of diethylsulfonmethylethethane every night before the show starts. Then maybe he'd condescend to reduce himself to a state of innocuous desuetude, not to say hebetude, or, at least, to lay off and go to sleep." (And when I woke up it was raining.)

LOS ANGELES SECTION

There is a fellow who I know
That always says with a sigh
If you can hear him why not me
And my answer to that is Hi.

Now that the new rules of the club are out, all a fellow has to do is read them and abide by the dictum (whatever that is). But in case he can't read he can have his grandmother write for permission to send on the air at a given time and place. They have someone to attend to such matters just as soon as he can find time. Of course time is long but it seems short for all they have to do—pole falling and all.

When it gets noisy around about the call 6AQT it is assumed the interest in radio among the femininity will be greatly accelerated. Some are wondering if it is really a (cutie) as the letters would imply. It is not known as yet whether the bunch will rush to Hollywood singly or in great numbers. Anyway, the position of 6AQT is a precarious one, any way you figure. (If I thought my correspondent wasn't kidding, I'd make a trip down myself.)

There is someone in Los Angeles called "J.D." Wonder if those are his initials or just his official call. Heard he called New Jersey one night but the latter, on account of a bad cold, couldn't answer. J.D.'s wife would have been mad anyhow because Jersey sounds feminine.

If "EB" and "AB" and "IK" should set up a second hand store they surely would get all the "beezeness" and still want more.

Arno has moved to a new location, 1045 South Bixel Street. He is waiting for his old friends to visit him and join with the new ones in the game of buying and selling.

A serious catastrophe befell one, namely, 6LC, when his transformer decided to have a smoke. It (the transformer) was rushed madly to the garbage can section of the property where a vicious stream of water put an end to its hilarity. Also its usefulness. But the loss was covered by insurance, in that, 6LC has an auxiliary stock of number twenty wire. MORAL: Beware of remote control.

About the busiest man in this radio business is the gent hunting news for this column. In fact he is so busy that if he was to pass away he wouldn't have time to lay down. Then again he has so much news he can't use it all. Mostly from a connivance to get pictures in print accrued from an idea someone has a swell station.

6ZR, who, while in Burlingame, was running a close race with Roy Gardner and the Turkish war for first page honors, has moved his limelight to Los Angeles. And I pity Los Angeles as far as the radio clientele are involved. You might as well put out the shingle "Radio Set For Sale" because you won't get a chance to use it anyhow when he opens up. He makes more noise than the blowing up of the "Maine."

A certain party claims that a message he sent was lost en transit. Says it puts him in mind of San Francisco to New York by airplane, 42 hours flying time or two months and three days elapsed time. He further affirms that the message must have went into a "tail spin" between 6KA and 6ZA. Maybe so, maybe so.

Mr. Lambert was of the old school. A little nip was his golden rule. So late one night upon the table He thought he saw a familiar label "Aha, my wife sleeps," he cried. As he made a leap, high and wide, He gulped it down in one big swig And then began a terrific jig That would produce vociferous flattery. It was acid for Bessey's battery.

Speaking of commercial operators, that reminds me of "Terrible" Happy Fabian of the "Wicked Watch Chain." If none of you have cast your eyes upon this wonderful linked specimen, do so, by all means, at the first opportunity. You will not need a blueprint to find it. You see the chain before you see Happy. You wonder where the chain is going with Happy and judging from the size of the chain my curiosity is

aroused as to the size of the "turnip." It must be a terrific piece of gigantism. But Happy always was a bear for conspicuousness. Years ago on the "City of Para" he was assigned. He bought up some gold braid and made himself a nifty uniform. Naughty but nifty. Now, in those days gold braid was drawing considerable water. The only man rating gold braid being the Captain exclusively. But that meant nothing in Happy's young life. With a fifteen-cent cigar, of which he smokes oodles and oodles, Happy went to the dining room, along with his gold braid. Everything went lovely until the "Old Man" appeared for his victuals. Well—I won't need to delve further on the spontaneous combustion that followed. Just sing it to the tune of: "And Happy Ain't Wearing Gold Braid Any More, tum tee, tum tum."

Goofey McGlue will now sing, "Have you examined the brake lining on your rotary," accompanied by Dinty Moore quartet.

Boys, our worries are many. Absolutely numerous. Just as soon as KET gets off of 200 meters someone has to come along that's a little more QSA. KFS, the Federal beach station, is now in operation and open for business. However it is needless to announce this, as the first night he came in so neat on 200 that everybody knew it. My advice is that KFS need not send out more QST's that he is now open, as everyone that has a receiving set knows it from 200 up. Oh please, Mr. KFS, have a heart and try to confine yourself to 600 meters. We won't attempt to speculate on what would happen if we radiated on 600. Heavens, no!!

6XAF, Mr. Best, listens in three times a week between 8 and 9 p. m. and when he hears 6APH working he removes the cap from the mica diaphragms on his fones and applies the concoction from the diaphragms to his face for a MASSAGE. This method of vibratory massaging is beneficial on account of the high frequency. The result being a vibratory violet ray effect. Those coming in contact with Mr. Best kindly take note of his ruddy complexion.

NORTHWEST BRIEFS

According to all reports, things have been more or less stagnant during the past few weeks, possibly on account of the hot weather. The banquet in Portland, however, was a howling success and everyone enjoyed themselves with a relish that would indicate other banquets are in contemplation. There were 125 or more present. This number not only comprising the district in and around Portland, but as far north as Tacoma and Seattle. Five members were present from Seattle and twenty from Tacoma. One feature of the banquet was the up-to-snuff method two members used in transporting themselves from Camp Lewis. They came via airplane.

The Secretary of the state of Washington made a special trip to Portland in order to be present, his object being to bring up the suggestion that amateurs broadcast the description of stolen automobiles.

7JW, Mr. Tait, paid me a visit recently and I was much impressed with his report of the doings in and around Portland, Tacoma and Seattle. I certainly take off my hat to this worthy disciple of the "air" clientele and if he is an example of the progressive spirit in which the northwest seems to be imbued, I must remark that as far as enterprise is concerned, there is no better.

Miss Winnifred Dow, a leading figure in radio at Tacoma, was present at the banquet and her smiling visage was an inspiration for many. In fact, a great deal of credit goes to all of the ladies. However, I am forced to say that 7ZB was a little unobscured as to the other ladies present. His traveling mind seemed had centered in and around the Tacoma delegation. If there should be a banquet in Tacoma soon I am speculating as to the method 7ZB would use for transportation. Surely not by airplane. That would not be fast enough. Somebody's dance card would look like this: "7ZB first dance, 7ZB second dance. All dances reserved for 7ZB."

A movement is on foot to amalgamate the clubs of the Northwest. This was met with great favor at the banquet, and the machinery of details and plans will be put in motion shortly. It is planned to have a yearly convention at which each branch will be represented. It will probably be incorporated under the title of the Northwestern Radio Association.

Phone Kearny 2778

PACIFIC RADIO SCHOOL

ARC & SPARK SYSTEMS

Hours:

1 to 5 P. M.

7 to 9 P. M.

433 Call Bldg.,
San Francisco, Cal.

Send for descriptive circular.

CALLS HEARD BY

WESTERN AMATEURS

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

HEARD AT KMT, LIBBYVILLE, ALASKA
May 29, 1921.

6EX, 7BK, 6IM, 6AGF. Location of station KMT is Latitude 59 deg. 35 min. North Longitude 157 West.

The correct address of Mr. A. B. Lopez is 720 Santa Barbara St., Santa Barbara, Cal.

Station 6DS is located at Alhambra, Cal., instead of Alameda, Cal., as previously listed.

HEARD AND WORKED BY 6DS

ALHAMBRA, CALIF.

5XD, 5YA, 5ZA, (6AE), 6AH, 6AI, (6AK), 6AN, (6AR), 6ADA, 6AAK, (6AAW), (6ABW), (6ACR), (6AGF), (6AIW), (6ANK), 6BB, 6CO, 6CP, (6DP), (6EX), 6FH, 6FI, 6FX, 6GE, (6HC), 6HH, 6HP, (6IC), 6IM, 6JJ, 6JI, 6JN, 6JR, 6JT, 6KC, 6KL, 6KM, 6MZ, DAY LIGHT, 6NH, 6OC, 6OH, 6OT, 6OW, (6PR), 6QR, 6QS, 6TC (6TV), 6TX, 6VM, 6VX, 6XZ, (6XAD), 6ZA, 6ZB, 6ZE, 6ZH, 6ZK, 6ZM, 6ZO 6ZR, (6ZU), 6ZX, 6ZY, (6ZZ), 6ZAA, 7AC, 7CU, 7IN, 7YA, 7ZJ, 9LR.

CALLS HEARD AT 6FB

REDONDO BEACH, CALIF.

May 17—June 10, 1921

6AL, 6AM, 6BJ, 6FH, 6HC, 6HP, 6IC, 6IM, 6JM, 6KC, 6KM, 6MX, 6MZ, 6TF, 6TV, 6VX, 6WG, 6WN, 6XN, 6YA, 6ZO, 6ZU, 6ZZ, 6AAH, 6AFQ, 6AFU, 6AFY, 6AGF, 6AGP, 6AIH, 6AIW, 6APH, 6XAD, 7HF, 7MF.

CALLS HEARD AT 7MF

EUGENE, OREGON

(6AE), 6AK, 6AR, 6AL, 6AZ, 6BP, 6DD, 6DP, 6DX, 6EA, 6EB, 6EL, 6FH, 6HE, 6IC, 6IF, 6IM, 6IW, 6IY (CW), 6KM, 6LR, 6LU, 6LW, 6LX, 6NB, 6OC, 6OH, 6OW, 6PN, 6QR, 6TV 6WZ, 6XW, 6ZA, 6ZU, 6ZR, 6ZX, 6ABM, 6AFN, (6AGF), (6AIW), (6AMW), (6ARK), 7AC, 7AD, 7AX, 7BA, 7BC, 7BH, 7BK, 7BQ, 7CB, 7CU, 7CW, 7DA, 7ED, 7FH, 7FI, 7FL, (7GA), 7GY, 7ID, 7IM, 7IN, 7GW, (7KB), 7KM, (7LD), 7LJ, 7LR, 7MW, 7NN, 7NX, 7OT, (7PH), 7QY, 9LR, 9XI (CW), 5BA, 5IF, 5ZA, 5EL.

CALLS HEARD AT RADIO STATION 7HN

May 1 to June 10

6AE, 6AK, 6AR, 6AT, 6AV, 6BR, 6BW, 6CH, 6ED, 6EN, 6EV, 6EX, 6FE, 6FT, 6HC, 6HP, 6IV, 6JR, (6KL), 6KM, 6KS, 6LD, 6MZ, 6NG, 6OH, 6PR, 6QR, 6QU, 6SC, 6TU, 6TV, 6VX, 6ZK, 6ZR, 6ZU, 6ZX, 6AAI, 6AAR, 6AAU, 6ADW, (6ABM), 6ABX, 6ACM, 6ADS, 6AFM, 6AFN, 6AFU, 6AGF, 6AID, 6AIU, 6AIW, 6AMW, 6APH, 6ARE, CW STATIONS 6AAT, 6ANJ, 7BC, 7BK, 7BQ, 7CA, 7CB, (7CE), 7DA, 7ED, (7FI), 7ID, 7IC, 7IN, 7IG, 7KM, 7KQ, 7LR, 7NL, 7NN, 7XD, 7ZD, 7ZJ.

Northern Radio Company

HAS OPENED IT'S Seattle CW Radio Store

We carry practically all of the standard makes of apparatus, we sell them at the standard advertised prices, f.o.b. Seattle, and we give speedy, dependable, mail order service.

We are specialists in CW, and will shortly have one of the most complete stocks of CW apparatus on the Pacific Coast.

WE ARE INSTALLING A RADIO TELEPHONE FOR BROADCASTING PURPOSES WHICH WILL BE HEARD FROM ALASKA TO CALIFORNIA.

Our complete catalogue, containing diagrams, formulas, and the latest CW and telephone data, will be ready for distribution at an early date. A stamp will put you on our mailing list, but quick action will be necessary—as the issue is limited.

SPECIAL:

The first of the NORTHRAD CW line:

CW transmitting condenser, fixed variable, .00025 to .00075 mfd., mica-copper foil, Bakelite mounting.

A dependable, accurately rated, and efficient unit—tested to 2000 volts—absolutely guaranteed.

PRICE 60c POSTPAID

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418 UNION STREET - - SEATTLE, WASH.

JUST THE THING

For C. W. AND WIRELESS PHONE RECEPTION

Type V-1 \$5⁵⁰
VariometersType V-1 \$4²⁵
Variocouplers

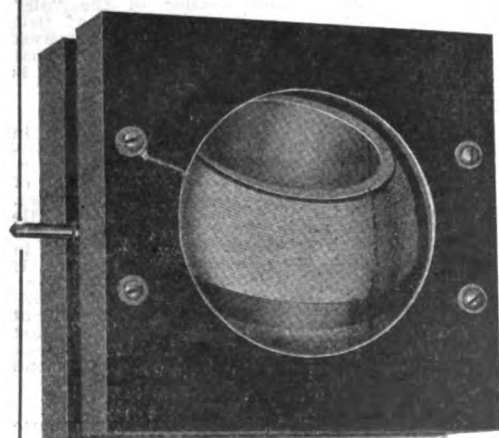
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McGUIRE RADIO LABORATORY

Manufacturers of Radio Apparatus

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San Francisco, Calif.



GREATER EFFICIENCY IN RECEIVING EQUIPMENT

By Collin B. Kennedy
President, The Collin B. Kennedy Co.

THE writer has always held the opinion that the development of radio receiving equipment has not kept pace with that of the transmitting end. We have high powered transmitting stations developed to a high degree of perfection, but have not taken full advantage of the energy being brought to the receiving board.

This explains why the company of which the writer is a member has sought to specialize almost exclusively on receiving equipment, as representing the field offering the greatest latitude for constructive effort. The success attending its efforts in this direction is attributable simply to painstaking work in the development of designs calculated to give maximum effectiveness. In so doing it has made free use of the accepted and proven principles of radio engineering, and has not permitted the bugaboo of cost to swerve it toward less efficient expedients.

All circuits used in Kennedy receivers are electro magnetically coupled, this being the best known method for obtaining selectivity. This principle is fully recognized by manufacturers of high grade apparatus for commercial and military purposes, and the technical considerations are brought out and emphasized by the Bureau of Standards in various publications.*

A well defined though weak signal on a silent background is much more easily read than one of greater intensity in the presence of interference. The measured audibility of a signal is, for this reason, very de-

SCHEDULE OF CW TRAFFIC—SIXTH RADIO DISTRICT

By LAWRENCE MOTT, Associate Editor

(Note: Stations interested in the reception of CW may listen at the times noted, on the wave of the station listed. It is urgently requested that all operators copying the CW traffic schedule QSL the same direct to the transmitting station. Transmitting stations are politely requested to report success and work accomplished to me at Avalon, Catalina Island, California, on or before the 8th of each month in order that their efforts may be tabulated and appear in the following number of Pacific Radio News.—Associate Editor.)

Time*	Station	Wave-length	Time*	Station	Wave-length	Time*	Station	Wave-length
9:00	6XAD	240 & 375	9:45	6ALU	200	10:30	6HK	200
9:05	6PI	200	9:50	6EF	200	10:35	6ZB	375
9:10	6EN	200	9:55	6IT	200	10:40	7ZI	...
9:15	6WU	200	10:00	6CU	200	10:45	6IY	200
9:20	6JE	200	10:05	6XN	...	10:50	6ZE	375
9:25	6MK	200	10:10	6XD	...	10:55	6ZX	...
9:30	6ALE	200	10:15	6AQA	200	11:00	5ZA	375
9:35	6KA	200	10:20	6KP	200			
9:40	6HU	200	10:25	6BA	200			

All other CW operators who wish to join in this arrangement will please notify me as soon as practicable.

*Owing to a press of other matter, in summer evenings, 6XAD may not find it possible to be on every night.

ceiving, and it will be found that one showing greatest strength on an audibility meter is very often the most difficult to read on account of accompanying interference. This shows the importance of adopting means whereby the ratio of signal strength to interference is increased and is best accomplished by reducing electro static coupling and providing means for the proper control of electro magnetic coupling. The writer has been able at noon in San Francisco, for example, to copy complete messages from Atlantic Coast stations, using a small antenna suspended from an automobile with the frame of the car as a counterpoise ground, and a standard receiver without amplifiers.

The diminution of energy losses in receiving circuits is highly important on account of the minute quantities involved. This is largely a mechanical problem and the solution lies in adopting designs which tend to eliminate interaction between circuits and

preventing absorption of energy by unused resonant sections.

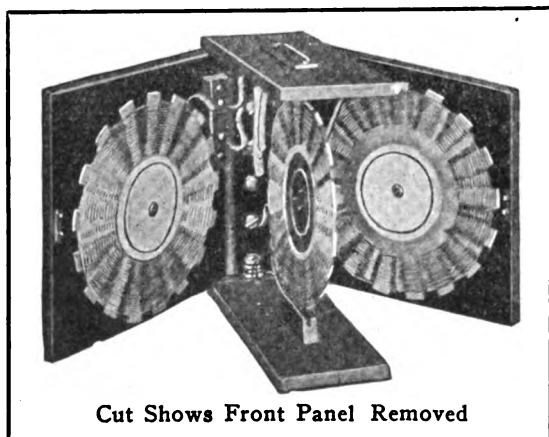
The rapidly increasing use of continuous wave transmission at the higher frequencies, as in voice transmission, has created a demand for receivers of greater flexibility. This requirement has been anticipated and met in the newer types of apparatus manufactured by the Collin B. Kennedy Co., in which provision has been made for complete control of regeneration with resulting voice reception remarkably free from distortion.

The present day amateur and experimenter is demanding, more than ever before, apparatus embodying the above mentioned principles as a means for obtaining greater efficiency. This is a source of great satisfaction to the writer, who has always made a plea for quality in radio apparatus.

*For example, see page 45, Bureau of Standards, Bulletin 4, Radio Instruments and Measurements.

—Not Advt.

SPIDER WEBS-



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

are now manufactured on a large enough scale to have the price

REDUCED TO

lower than originally. A complete regenerative set, the equal of any, for only

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The New 3000 Meter Set Will Be Out Soon

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**Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others**

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

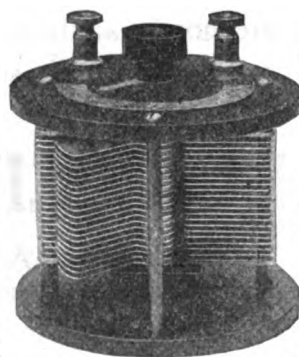
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13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.

With Style No. 1, we will, if desired, furnish 3 inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial.

Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

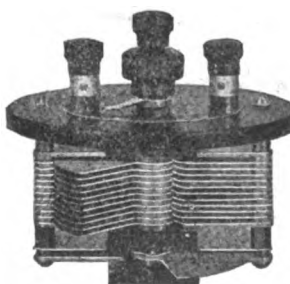
We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave., Springfield, Illinois



VERNIER

A HARD BOILED BUNCH

(Continued from page 11)

giant cannon, an' the wind shook the shack till I half expected her to go off into the bay. Just when the gale was at its worst, I sees a little gray dory comin', divin' through the seas. In a few minutes it was in the shelter of the cove.

"It's Hell-Fire," says Dopey, who'd been tryin' to help me with the engine. The storm-king makes his boat fast alongside the dory wharf, an' comes up to the shack.

He was a big six-foot savage, an' looked like a first-class pirate, with his red mackinaw, corduroys, highcut musher boots, an' a black fur cap. He had a big gun in his belt under his mackinaw, an' walked like he was ready to start a battle on a second's notice.

"Fine weather," he grunts, rubbin' the frozen salt crust off his face onto the sleeve of his mackinaw, which was runnin' with sea water. "I hope it holds on till I get back to Popoff."

When I tells him about the engine trouble he goes into the power room, an' glares at the one-lunger.

"Buckin' again, eh!" he snarls, in a voice so hard-boiled it makes the engine look kind'a green an' sick. He squirts a little primin' in the cups, whips out a few special cuss words, punches a couple levers, an' kicks the flywheel—an' the engine begins hummin' like a Pierce-Arrow.

After I'd cleared with N-P-R, we sit by the coal heater in the operatin' room an' chewed the rag.

"Today is my twenty-eighth birthday," I remarks. "An' if some fortune teller had ever told me that on this day I was goin' to be sittin' in a shack on a sea-washed rock up in Alaska among the crowd of gun-powder maniacs, I'd a told her she was crazy."

"You say today's your birthday," exclaims Hell-Fire.

"Yes," I answers, which was the foolish thing I ever done in my life.

"Then you gotta make a dance in th' hall tonight," he declares. "I'll go out an' tell th' gang, an' we'll make things ready."

I protests strong against that, but he tells me it's got to be done.

"To make a birthday dance is the oldest custom in the Snumagin Islands," he insists. "If you don't, they'll think you're stuck up—they'll come up here an' shoot th' shack t' splinters."

I'd seen all the shootin' I wanted already, so that night we have the dance—an' it was a dance I'll not forget. The dance hall, which was perfectly round an' about fifty feet in diameter, had once been a cyanide tank in the gold mine up the bay. It'd been roofed over, windows put in the walls, had a big coal heater on one side, an' a bench runnin' all around the wall. It was all decorated up with paper bells an' truck, an' was lighted by a single big coal oil lamp hangin' from the ceilin'.

But if the dance hall was wild an' woolly, the dancers were wilder an' woollier. Evenin' dress was mackinaw coats, rubber boots an' shootin' artillery. The women was mostly Aleute breeds, an' all sat on one side of the hall, with the men on the other. The orchestra was a leather-lunged accordion an' a mistuned guitar, while the style of dancin' was rag, dip, shimmy or anythin' you please. The fishermen were half full of brew, an' among them I notices Mexican Frank, watchin' me with a kind'a evil eye.

Before the dancin' had been proceedin' more'n two hours, there'd been four fist fights an' a dozen cursin' matches.

"It's a pretty good dance, but it's too blame slow," grumbles Hell-Fire, about 10

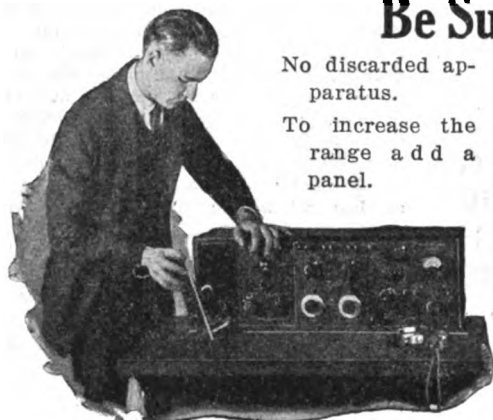
(Continued on page 24)

If It's a Radiophone—It's a deForest Invention

RADIOPHONE

REG. U.S. PAT. OFF.

Be Sure It's the deForest Design of Wireless



No discarded apparatus.

To increase the range add a panel.

FOUR PANEL STATION

Complete set of four units mounted vertically.

- (1) Complete radio "Midget" transmitter. Phone sending range 30 miles (OF-3).
- (2) Complete short wave tuner, 150 to 600 meters (MT-100).
- (3) Complete audion control, especially for gaseous tubes (MP-100).
- (4) Complete one-step amplifier (MP-200).
- (5) Any additional step of amplification may be added.

It is better to be sure first than sorry afterwards.

The deForest "Interpanel" system is for amateur and commercial CW telegraph and telephone stations. It is the one design absolutely necessary to get full success of CW transmission, made possible by Dr. deForest's invention of the audion.

Each panel is only 9 inches high.

Each panel mounts a **complete** apparatus.

Each panel gives the exact space best suited to all parts.

Panels may be combined in any relative positions.

Get the "Interpanel Idea." Send for Catalogue 88

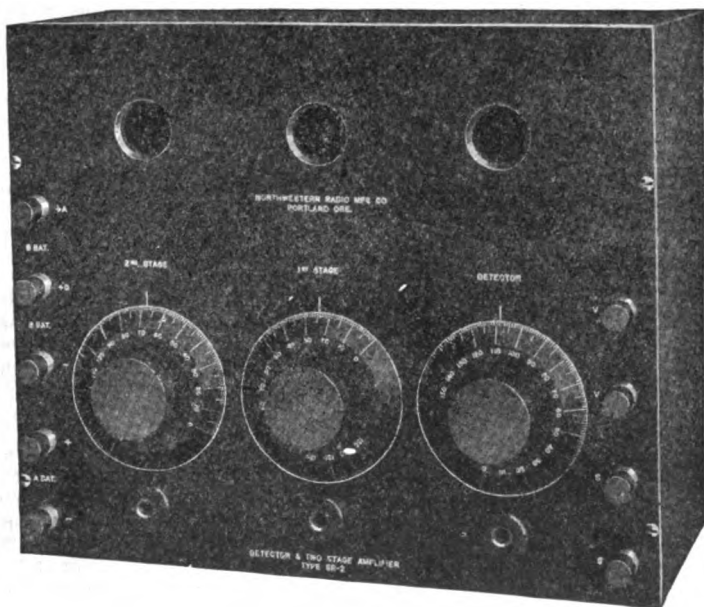
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Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

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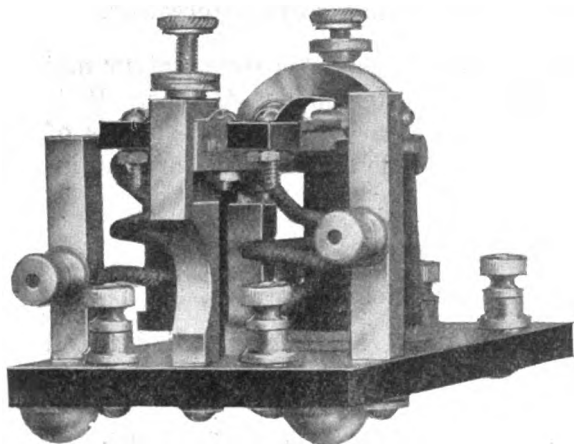
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BREAK!
BREAK!**

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Hear the other fellow while you are sending and "QRT" until he is through



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This instrument should be in every station. Why repeat over and over again because the other fellow can't get you thru the "QRM"? Just as soon as somebody "busts you up," you can hear him while you are sending. If the other fellow has "QRM," he can tell you while you are sending and you can "QRX" until he finishes.

NO BOTHERSOME SWITCH TO THROW

Every time you press the key the aerial and ground circuits are connected to the transmitter and the receiver is short-circuited. Every time you release the key the aerial and ground circuits are automatically connected to the receiver.

USE IT WITH YOUR BUG OR COOTIE KEY

By merely connecting a Morse Key, Bug or Cootie Key to two binding posts on the base of this instrument, you can send at any desired speed without fear of having the contacts stick.

WORKS ON 3 VOLTS

Only two dry cells are needed to operate this instrument. Two large contacts, sufficient to carry one kilowatt, automatically break the transformer primary circuit with every touch of the key.

RUGGED CONSTRUCTION THRUOUT

The entire instrument is mounted on a heavy Bakelite base, fitted with soft rubber feet. Eight binding posts are provided for connections. All brass parts highly nickel-plated. Here you have an automatic aerial switch and main key to break the transformer current all in one instrument—all working in one operation. The price is less than that asked for a good aerial switch alone. Think of the convenience of not having to throw a big switch. Think of the time and trouble you save by eliminating repeats.

SPECIAL INTRODUCTORY PRICE OF THIS RELAY FOR AUGUST

\$9.75

Prepaid to any part of the U. S. Full directions for operating and complete wiring diagram given with each instrument. All orders filled immediately—No delays.

ORDER YOUR BREAK-KEY TODAY

Watch for our next month's ad on another time and money-saving device.

We have a few JEWELL Zero to Five Ammeters (A. C.) for your power circuit that we are selling for \$4.00. Regular price of these Ammeters is \$8.00. Postage 25 cents.

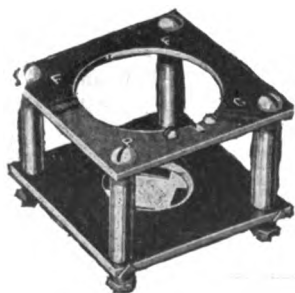
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By departing from conventional design in audion sockets we have combined the advantages of all the disadvantages of none and a price lower than any. Think of it—a sturdy easily mounted socket that is heat proof, has bakelite-dilecto insulation, handy binding posts, etc., all for 75c.

And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount, has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

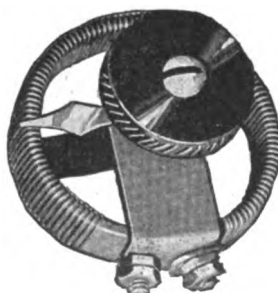


Type 126, Tube Socket

Price **75c**

Postpaid

The Wilcox Laboratories
Lansing Dept. J. Michigan



Type 122 Rheostat

Price **90c**

Postpaid

A HARD BOILED BUNCH

(Continued from page 22)

o'clock. "I wish somebody'd start somethin' an' put a little life in things round here."

I feels pretty uneasy after this, but things goes along fairly peaceful, until at last some addle-brained boob hollers out, "Ladies choice," an' right then was where I gets in trouble. I'd been keepin' carefully away from Mexican Frank's wife all evenin', but now what does she do but come straight over an' chooses me for her partner. Everybody was pretty well tanked up with the sourdough brew, an' the rough-neck orchestra tore off a wild an' woolly one-step that got faster an' crazier, until at last when the finale arrives with a grand smash of mad music, the fiery-eyed breed-girl, gone crazy with dancin' an' moonshine, throws her arms plumb around my neck an' plasters a red-hot kiss right on my lips.

The next instant, I sees a cannon spoutin' fire in Mexican Frank's fist, an' a speedy bullet clips a groove through my hair, which must'a been standin' straight on end.

"Whoopla! Hurrah!" howls Hell-Fire, joyously, producin' his forty-five centimeter howitzer an' blazin' away at the lamp. He puts it out first shot, an' then there started the blastedest pandemonious of fightin' an' howlin' an' cursin' an' shootin' you ever could imagine. It beat the roughest Tom Mix movin' picture ever made by forty times, with guns spittin' fire in th' dark an' everybody millin' an' stampin' like a crowd of wild bulls.

Seein' a gleam of light, I makes for it, an' dives through a window, landin' in a puddle of mud an' slush outside. It was still rainin' an' blowin' an' dark as pitch, but I scrambles along the bank to my shack in about five seconds, an' gets the old gasoline mill goin'. Sittin' in, I calls C-Q a couple times, but don't raise nobody. I hears the crowd of gun-fightin' maniacs yellin' an' shootin' out among the shacks, an' comin' closer all the time. Gettin' desperate, I opens up full power an' pounds out distress signals—which I figgers I was justified in doin' under them circumstances. "S-O-S, S-O-S, S-O-S, de K-V-I, K-V-I, K-V-I," I hammers out, slow an' heavy.

Listenin', I hears a jerky little spark start up an call:

"K-V-I, K-V-I, de N-R-X, N-R-X; this is the revenue cutter 'Unalga,' twenty miles west Unga—what's the matter? Is Unga Island sinkin'?"

"No, but it ought to," I pounds back. "Th' shootin' iron artists are havin' a grand killin' campaign, an' I'm leavin' th' island instantaneously—please ask th' skipper if he'll come by an' pick me up."

The kid on the cutter tells me to Q-R-X; but in a minute he comes back again.

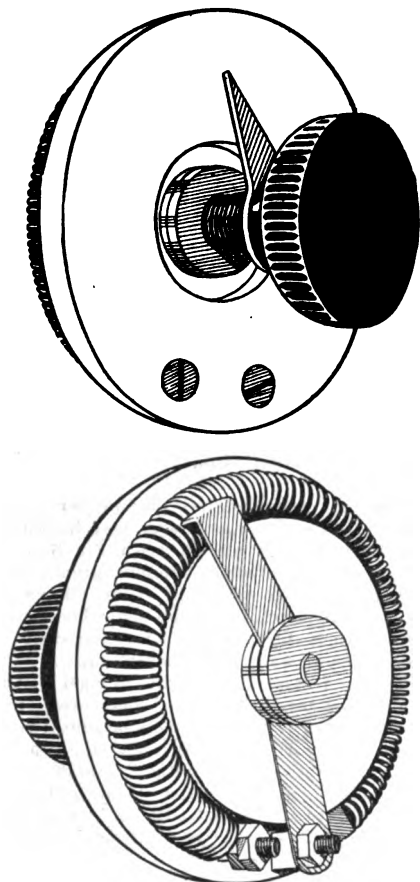
"Sorry, O-M," he says, "but the skipper says he wouldn't come near that cursed Unga Island f'r all the love in heaven or all th' money in Rome—hope you come out all right."

"Yes, I'll come out with more holes 'n a colander, if I stay here—" I hesitates as a bullet splits a panel in the door, an' another one drifts clear through an' knocks the lid-lifter off the stove. "Tell your skipper I'm drivin' straight to sea in a fishin' dory, an' ask him for th' love of Peter to come an' pick me up."

I stops to listen, but about that time another bullet ploughs into my desk, maybe two inches from the key-knob; then still another one comes, sput! right into my audion-bulb, an' a piece of flyin' glass gives me a bad gash in the chin—you see th' scar's here yet.

(Continued on page 26)

SHRAMCO -REO-



For your power tube—

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

A BACK MOUNTED panel rheostat, specially designed for the Radio-tron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2½ in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt Detector

and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price, \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2½ in base.

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Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

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APPROVED BY THE NAVY DEPARTMENT
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AMATEURS AND EXPERIMENTERS—Get in touch with your dealer.
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SUPPLIED IN MOST USED CAPACITIES FROM .01 TO .00025 MFD.
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ESPECIALLY DESIGNED FOR C. W.
WILL CARRY ONE AMPERE AT 1000 VOLTS
RUGGEDLY CONSTRUCTED
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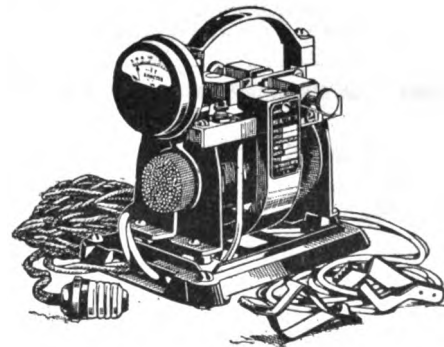
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Bantam Type 6 charges 6 Volt Battery,	at 6 Amperes	\$15
Type 16 charges 6 Volt Battery,	at 8 Amperes	\$24
Type 166 charges 6 Volt Battery,	at 12 Amperes	\$32
Bantam Type 12 charges 12 Volt Battery at 6 Amperes		\$15
Type 112 charges 12 Volt Battery,	at 6 Amperes	\$24
Type 1612 charges 12 Volt Battery,	at 7 Amperes	\$32
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes		\$48

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights Complete with AMMETER and BATTERY CLIPS, 11 to 15 pounds. Order from your Dealer, or send check for prompt Express Shipment. If via Parcel Post have remittance include Postage and Insurance Charges, or have us ship C. O. D.

WIRELESS OPERATORS, EXPERIMENTERS, CAR OWNERS, STORAGE BATTERY USERS



SERVICE STATION CHARGING SERVICE AT ANY LAMP SOCKET

Other F-F Battery Boosters charge batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. If not ready to order now, write today for Free Descriptive BOOSTER Bulletin No. 33.

BATTERY CHARGING STATIONS and GARAGES Use Our Large F-F ROTARY RECTIFIERS for Group Charging. Real Economy in first cost and in service. Charges up to 36 cells. Full Wave, Automatic, Dependable. It will also Rectify High Voltage. If the 110 Volt Primary of a high voltage transformer is connected to the Direct Current side of the F-F Rotary Rectifier, the secondary will deliver high voltage Uni-directional current suitable for Radio Work.

Write today for Descriptive ROTARY Bulletin No. 33A, which gives full information, or mail Check with Order.

THE FRANCE MFG. CO.

Gen. Offices & Works, Cleveland, Ohio, U.S.A.

Canadian Representative: Battery Service & Sales Company, Hamilton, Ontario, Canada.

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

233 Broadway, New York City

332 S. Michigan Ave., Chicago, Ill.

525 Market St., San Francisco, Cal.

411 S. Main St., Los Angeles, Cal.

301 Fifth Ave., Pittsburgh, Pa.

1710 Royal Bank Bldg., Cor. King and Yonge Sts., Toronto, Ontario, Canada

A HARD BOILED BUNCH (Continued from page 24)

Abandonin' the shack, I gets out in the rain again, an' half tumbles down the hill to the dory wharf. Climbin' into one of the dories I was somewhat acquainted with, I lets go the painter an' starts the little engine in the stern. As I dashes out into the storm there comes a rattle of heavy artillery from up on the rocks, an' a few minutes later I hears about twenty-five power dories comin' poppin' out into the bay after me, full of crazy codfishermen, still whoopin' an' shootin'.

Gettin' out into Nagal Straits, I drives straight to sea through the sleet an' rain. The fishermen seemed to get more speed out of their dories than I could out of mine, for they kept gainin' on me. Their bullets come whistlin' closer an' closer all the time, until pretty soon they began plunkin' against the side of my dory. I huddles down in the fishy-smellin' bilge water in the bottom of the boat, steerin' mostly by guess work; an' all the time the codfish dories was gettin' nearer an' the bullets was hittin' harder. At last a whistler bores through the bulkhead an' punctures the fuel tank.

In a few minutes the engine begins to miss an' slow down.. I was just beginnin' to believe it was all off with Sir Samuel Jones, when all of a sudden, crash! the dory bangs into somethin' that staves in the bow an' sends me head over heels into the ocean. My hands come against a smooth iron wall, an' lookin' up in the darkness, I sees I'm right alongside the revenue cutter "Unalga." The crew had heard me hit, an' they lowers a line, which I gets hold of. As they haul me up on deck, the cutter's searchlight starts sputterin', an' somebody turns it out onto the crowd in the pursuin' dories, who were still shootin'. In the nearest one, I could recognize Mexican Frank.

"Come back an' fighta like a man, you coward!" he howls, wavin' a smokin' high-power cannon in one fist an' some kind of a big gleamin' carvin' knife in the other. "Come back, damma you, an' I shoota you so full of lead you seenka to the bottom withouta ballast!"

"Let's get away from this god-forsaken island," mutters the skipper of the "Unalga," an' he rings the engine telegraph up to full ahead.

Half an hour later the cutter's code-slinger hunts me up with a message.

"It was routed to K-V-I, but I told N-P-R you were here, and I took it for you," he explains, handin' it to me. As I unfolds it, I sees it's all the way from Frisco, an' addressed to myself.

"Samuel Jones, Unga Island, Alaska—

With best wishes for a happy birthday; the gang and myself join in hoping you are enjoying the acme of peace and quiet at Unga.—Cunningham."

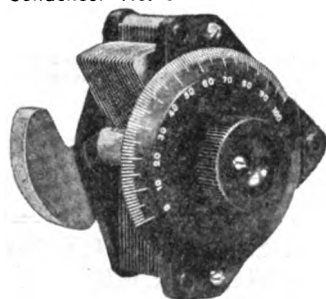
"Amen!" I mutters, as the "Unalga" hooks up to a fourteen knot clip, an' heads out to sea.

ARE YOU INTERESTED IN C.W.?

If so, write at once to our Associate Editor, Mr. Lawrence Mott, Avalon, Catalina Island, Cal., and have him arrange a calling schedule for your station. Further details of the C.W. Club's progress will appear in our next issue.

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Weight Lbs.	Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/4 x 3 1/4	1 1/4	\$5.00
2	.0006 m. f.	Mounted	4 1/4 x 4 1/4 x 2 1/4	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/4	1 1/4	4.25
4	.0006 m. f.	Without Dial	4 1/4 x 3 x 3 1/4	1 1/4	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

SERVICE NORTH! SOUTH!

We are pleased to announce
the Opening of our New Store
at LOS ANGELES, CALIF.

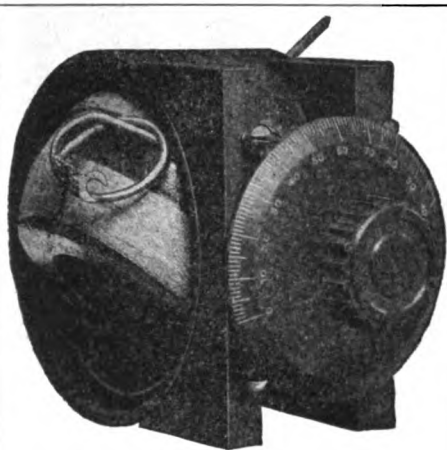
Have you sent for your copy of our 200-page radio manual? It is a complete catalog of the latest and best radio equipment you can purchase anywhere. It will help you purchase the best equipment at lowest prices—and it comes to you for only 35 cents in stamps. This amount will be refunded to you with your first \$1.50 purchase from us.

LEO J.
MEYBERG
CO.

The largest and
most complete stock
of Radio Apparatus
on the Pacific Coast.

LOS ANGELES
752 So. Los Angeles St.

SAN FRANCISCO
428 Market St.

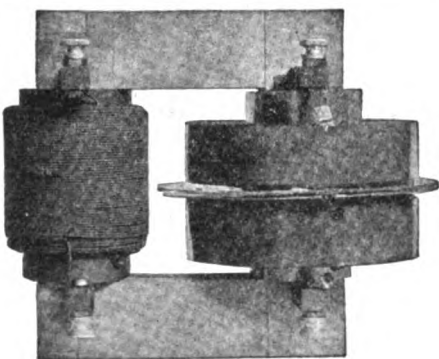


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob\$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price\$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps

Receive Wireless Telephone Concerts in Your Own Home

PICK up radio phone concerts, time signals, ship, shore and amateur stations, right in your own home—with an **ABC receiving UNIT**. Simple to operate—no license, battery or special knowledge needed. Price of Unit alone, \$24.50. Phone, aural, all equipment to complete station included in **ABC "Complete Package"** for \$75.00.

Send 10 cents for our 16 page booklet, "How I Put Up a Complete Radio Station in a Hour," an actual story that you can duplicate. Request Booklet <8>

Wireless Equipment Co. Inc.
Newark, New Jersey

ABC UNIT
Standardized Radio Sectional Receiving

INTERRUPTERS IN VACUUM

(Continued from page 15)

ficial means may be used to cool the device, such as by radiating fins, cold air or liquids. Interrupters in a vacuum cannot probably handle as heavy currents as where they are used in open air, but for smaller currents they should be far more efficient. One way to overcome this would be to connect a plurality of interrupters in multiple.

Above interrupters can be disposed in the antennae, primary or secondary circuits for interruption either at the transmitting or receiving station of undamped waves to audio-frequency groups.

The evacuated microphone could also be used as a howler and disposed in the antennae circuit for telegraphy modulation of CW.

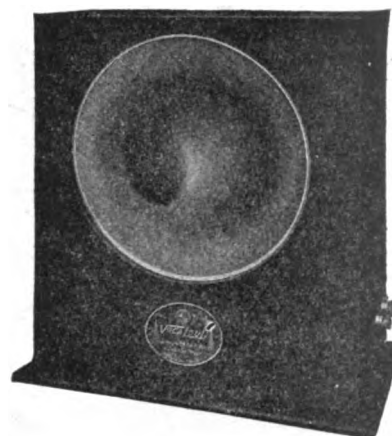
Above discoveries, if they prove to be correct, open up new fields of research and study which seems unlimited.

The Northwest Radio Service Co., 609 Fourth Ave., Seattle, Wash., which entered the amateur field only a little over a year ago, has grown into one of the leading retail firms on the coast, it now maintaining the largest stock of radio material in the Northwest. In addition to retailing apparatus of all leading makes, it has recently entered the manufacturing field on an extensive scale. The apparatus turned out by this company has been appropriately named "PUGET" products, and has already met with a very favorable reception by the amateur trade. The PUGET line includes the Puget Transformer, Oscillation Transformer, Transmitting Condenser, Variometers, Short Wave Regenerative Sets, and many other items.

—Not Advt.

U. S. NAVY GETS FIGHT RETURNS TO HONOLULU IN ELEVEN MINUTES

Only eleven minutes and fourteen seconds after the knockout of Carpentier by Dempsey, the Honolulu papers had in their hands a press dispatch from the U. S. Naval Radio Service. The dispatch was carried on the special leased US wire and transmitted by NPG to NPM.



THE—

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. *As good as it looks!*

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3/4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life". Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G6. 4 West Park St., Newark, N.J.

RADIOTRON U.V. 200
The long distance detector
PRICE \$5⁰⁰

MODEL U.V. 712
Introducing
Model U.V. 712

RADIOTRON U.V. 201
An exceptional amplifier
PRICE \$6⁵⁰

RADIOTRON UV 200 Gas Content Detector Tube. The DX stations are using them for that "long distance" reception. Have your friend bring his Radiotron to your station and compare it with the tube you are using; then send to your dealer for a Radiotron.

PRICE 5.00

RADIOTRON UV 201 High Vacuum Amplifier Tube. The amplifier that amplifies. The kind that gives musical signals—not musical squeal. Eliminate what you think is static but what really is nothing more than tube noises. Do this by sending to your dealer for a Radiotron UV 201.

PRICE \$6.50

RADIOTRON UV 712 Intervalve Transformer incorporates certain features of construction and gives an overall efficiency not yet approached by any other type. It is a device of superior workmanship and it is not to be confounded with Intervalve Transformers designed only to be sold at a cheap price. The ratio of windings on the UV 712 Transformer is 9 to 1, a ratio found in no other instrument on the amateur market. Watch 'em copy it. The original only costs \$7.00. Why buy an imitation?

GRID LEAKS are essential to get proper bias on tubes, whether they be detector or amplifier. The potential maintained on the grid is computed by Ohm's Law and it is therefore equal to the grid current times the grid resistance. With a grid resistance of two megohms and a grid current of one microampere the bias negative potential will be two volts. A grid Leak mounting and six different values of grid leak units (changeable) costs but \$5.00—the benefit derived therefrom will more than pay you.

ARE YOU SATISFIED

With D-L-&W (Delay, Linger and Wait) Service? Or are you using TRTS (The Real Time Savers) Service? If we cannot supply you from stock and cannot get it immediately for you, you hear from us as soon as a letter can get to you. Isn't that enough to satisfy you? Try TRTS service and weep no more.

Get the Habit. Get TRTS Service

If your dealer does not stock Radiotron apparatus do not take something "just as good"—demand Radiotron. Request him to forward your order direct.

THE RADIO TELEPHONE SHOP

Agents for Radiotron Apparatus in Utah, Nevada, New Mexico, Arizona, California, Oregon and Washington.

175 STEUART STREET, SAN FRANCISCO, CALIF.

DEALERS: WRITE FOR OUR INTERESTING PROPOSITION

SPECIAL OFFER FOR THIS MONTH

No. 14 Hard Drawn Copper Wire (aerial wire), approximately 80 feet to the pound, 47½¢ per lb. (This offer is open to let you get acquainted with TRTS service. If you are contemplating putting up a new aerial, or adding to the one you already have, order now—today!)

DE FOREST HONEYCOMB COILS—NEW PRICES

DL 25.....	\$1.50	DL 300.....	\$2.20
DL 35.....	1.55	DL 400.....	2.40
DL 50.....	1.60	DL 500.....	2.55
DL 75.....	1.70	DL 600.....	2.80
DL 100.....	1.80	DL 750.....	3.00
DL 150.....	1.90	DL 1000.....	3.20
DL 200.....	2.00	DL 1250.....	3.55
DL 250.....	2.10	DL 1500.....	3.80

Pen Brand Grid Condensers.....	\$0.65
Pen Brand Series-Parallel Switch.....	1.00

ADD-A STEP—UNITS

Pen Brand Detector Unit.....	\$7.75
Pen Brand Amplifier RADIOTRON UV 712 Amplifier Transformer.....	17.50

HORNS **HORNS** **HORNS** **HORNS** **HORNS** **HORNS**
PAPIER MACHE HORNS—No distortion, but a clear, sharp signal. Use your own phones with them. While they last\$5.00

FORMICA PANELS

3-16 in. thick, 2¼¢ per square in. We cut panels to exact size and smooth off edges. For polishing, add 75¢ per square foot. Minimum charge 75¢. Panels drilled to your specifications, \$1.00 per panel.

METERS

3 in. flush type, INSULATED CASES. While they last only.	
500 Volt DC meter	\$14.00
100 Mil-amp. meter	6.50
300 Mil amp. meter	6.50
500 Mil-amp. meter	6.50

THE MAGNETIC AMPLIFIER

(Continued from page 9)

sections, each occupying a portion of a single fibre spool, which completely filled the space allotted between the walls of the cylinders. Taps from this winding were taken out thru the "washers." The details of this winding are not unlike those of any other simple form of solenoid and will not be considered here.

The radio-frequency winding was made of a special transmitting "Litz," capable of carrying 100 amperes without undue heating. Eight turns were provided and taps were taken off at each turn as shown in Fig. 12.

The artificial cooling of such a device as this is a matter of importance, as no small amount of heat is generated—this resulting primarily from eddy currents in the iron.

It was planned originally to cool the apparatus by forcing air thru the inner cylinder, but this method was soon doomed to failure in the initial tests. It was found necessary to immerse the whole apparatus in oil and to cool the oil by means of water circulation.

Preliminary tests of this apparatus, using 60 cycle alternating current in the radio frequency winding, were made to provide data for checking the design. Figs 9, 10 and 11 show the results of these tests graphically. It is interesting to note the increase in control as the ampere turns in

(Continued on page 30)



With some dealers, service is largely a matter of convenience—now it means one thing and later on another thing.

From near and far comes proper recognition that KELLY & PHILLIPS is more than a name. Amateurs everywhere are beginning to realize that it stands for a superior, dependable service: that it always means the same things—quick delivery, quality goods, and prompt and careful attention to even the smallest detail.

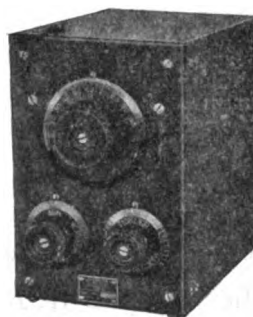
A trial will convince you.

Anything and everything in radio advertised in this magazine.

Radio Department

KELLY & PHILLIPS

312 Flatbush Ave., Brooklyn, New York



Westinghouse Radio Equipment

Westinghouse Radio Equipment embodies the latest ideas in receiving equipment, providing a most efficient set for telegraph and telephone reception over the amateur and normal ship wave-length ranges. Type R. A. Short Wave tuner, Style 307189, responds to a wave-length of 180 to 700 meters and is especially selective.

Type D. A. detector-amplifier, style 307190, combines a vacuum tube detector with a two-stage amplifier. Both units are mounted on Micarta panels attached to a polish mahogany cabinet. Simple in design—easy to operate—single-tuning circuit. Highly efficient.

PRICES

Type R. A.
Tuner
\$85.00

Type D. A. Detector-
Amplifier
\$85.00

Type R. C. Combination of first two units mounted in single cabinet \$125.00

Bulletin 14 sent on request to any reader of the Pacific Radio News.

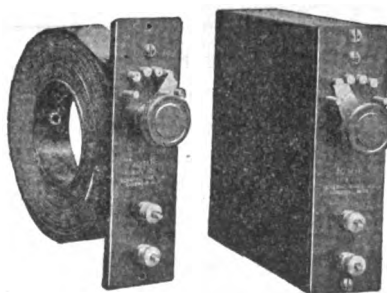
ATLANTIC RADIO COMPANY

Incorporated

88 Broad Street
Boston 9, Mass.

Branch, 15 Temple Street
Portland, Maine

Your Receiving Coil Problems Solved



TYPE 226
4 STEP INDUCTOR

Here is a coil of low distributed capacity, wide wave-length range, and which requires no auxiliary mounting.

Only four sizes required to cover all ranges from 150 to 22,000 meters using a .001 M.F. condenser.

Coupling varied by changing distance between coils.

Adapted for experimental use as well as for permanent installations.

PRICE \$6.00 EACH

Fully described in Bulletin 3020

GENERAL RADIO CO.

Manufacturers of

Electrical and Radio Laboratory Apparatus

CAMBRIDGE 39-MASSACHUSETTS

2119 Whitson St.,
Selma, Calif.,
June 27th, 1921.

Western Radio Electric Co.,
550 South Flower St.,
Los Angeles, Calif.

Dear Sirs:

Last winter I bought some Grebe Apparatus from you. I am so well satisfied with the apparatus and the way you treated me that I just have to tell the other fellows about it too.

Yours truly,

DORN STAMMERS, (Radio 6KX)

ONE OF MANY—AND UN-SOLICITED—WHY SAY MORE?



BURGESS "B" BATTERIES

ARE THE NOISELESS KIND—made with and without taps

Send for catalogue giving sizes and prices

BURGESS BATTERY COMPANY

Harris Trust Bldg.

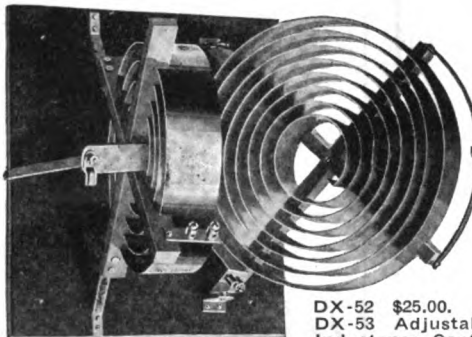
CHICAGO

Fight Returns Reach San Francisco in Record Time

The Pacific Radio Supplies Company and the San Francisco "Call" together "scooped" their competitors in broadcasting radio reports of the big Dempsey-Carpentier fight on July 2nd. Commencing with the initial bulletins describing matters of interest at the ringside prior to the fight, the introduction of distinguished guests, etc., followed by the announcements of the entry into the ring of first Carpentier and then Dempsey, bulletins relating every incident in each round were broadcasted promptly by radiophone not more than one minute after the actual happenings at Jersey City.

The DeForest radiophone set at the California Theater, operated by the Pacific Radio Supplies Co., was connected by special telephone to the local office of the International News Service. A special sounder was connected in at the International News Service office on their special telegraph line to Jersey City. As fast as the reports came in by wire they were telephoned to the California Theater and immediately transmitted by radiophone by the operator in charge, J. W. A. Legge-Willis.

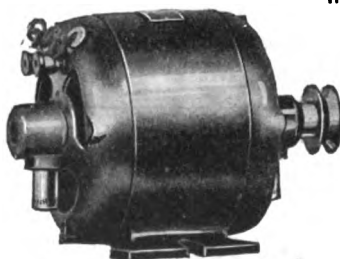
The radiophone service was so rapid and complete that bulletins had actually been given describing the first part of the fourth round before the "flash" came announcing the knockout. Considering the distance involved and the two relays necessary, i. e., from wire telegraph to wire telephone and from wire telephone to radiophone, it is believed that the speed of this service established a record in radio communication.



THE ANSWER TO TRANSCONTINENTAL TRANSMISSION

Use apparatus that has proven best. Ask 6AK and old 6EJ of Walnut Grove, Cal., about 8ZR's signals, or 7ZJ of Vancouver, Wash., and then decide upon the "DX" O. T. and Synchronous motor combination.

DX-52 \$25.00.
DX-53 Adjustable
Inductance Control \$35.00.



Add \$3.50 to list for 25 cycle motors. Prices are F. O. B.

SYNCHRONOUS MOTORS

H. P.		H. P.	
1-15.....	\$28.00	1-5.....	\$42.00
1-12.....	30.00	1-4.....	50.00
1-10.....	32.00	3-8.....	58.00
1-8.....	34.00	1-2.....	75.00
1-6.....	39.00	3-4.....	99.00

1-10 H. P. 3400 R. P. M. Non-synchronous Induction Motor \$25.00.

**THE AMERICAN RADIO SALES
AND SERVICE CO.**

Great American Bldg. Mansfield, Ohio
Testing Station 8ZR.

THE MAGNETIC AMPLIFIER

(Continued from page 29)

one winding approach the same value as those in the other for the designed value. In Fig. 11, it will be observed that one ampere in the control winding controlled 35 amperes in the other. It is evident from this that the use of the magnetic amplifier, or iron relay, is not limited to the control of high frequency currents. It is a device, the use of which is quite unlimited.

"B" BATTERIES

AN
EVEREADY
PRODUCT

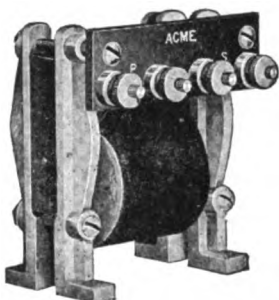
43V. Batteries, tapped.....\$5.00
22½V. Batteries, Navy Type... 3.50
22½V. Batteries, Commercial Type 2.50

Latter two types especially adapted to Cunningham and Radiotron Tubes. Postage Prepaid Anywhere in U. S.

Ets - Hokin & Galvan

Wireless Engineers
10 Mission Street San Francisco

ACME AMPLIFYING TRANSFORMER



THE PROPER ratio of turns and impedance, exactly suited to the new VTs is an important feature of the transformer shown above.

Our coils are of the paper wound type, thoroughly impregnated. They are provided with strong flexible leads, and contain no soldering flux of any description.

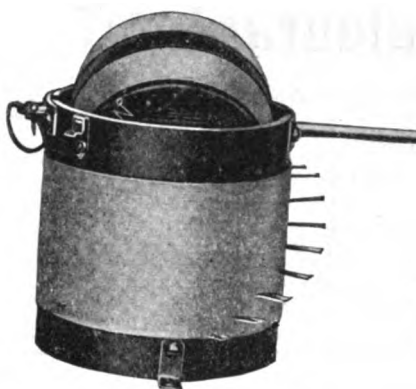
Get an ACME Amplifying Transformer and your transformer needs are cared for *perpetually!*

Electrically, mechanically and artistically—from every viewpoint an Acme is as good a transformer as can be made. And every instrument is backed by the ACME guarantee.

ACME APPARATUS CO.

182 Massachusetts Ave.
Cambridge, 39, Mass.

*Transformers and radio
engineers and manufacturers*



PRICE \$7⁵⁰

FOR THIS MONTH ONLY
**BALDWIN
VARIOCOUPLER**

The primary of this variocoupler is wound on XX Bake-lite tube—4 inches in diameter, 14 taps are taken off and by means of 2 sets of switches, a one turn variation of inductance may be obtained.

The shaft is hollow through which flexible leads run which connect to the rotor.

This is a decided advantage over other variocouplers as it does not depend on the bearings for connection.

DAVID KILLOCH COMPANY
57 MURRAY ST. NEW YORK

ANNOUNCING

Opening of the New Salesroom and Laboratory
of

RAY-DI-CO.

—the—

"HOUSE OF BETTER RADIO"

Saturday, August 20, 1921

where a complete line of standard apparatus,
parts and materials will be carried.

To the amateurs we extend a hearty invitation
to call and "get acquainted."

MAIL ORDERS GIVEN PROMPT ATTENTION

RAY-DI-CO

(Ray-Dee-Ko)

1547C N. Wells St. Radio 9AG

Chicago, Ill.

"We'll look for you at the First National Convention,
August 30-September 3, Chicago."

SPECIAL

Paragon Rheostat and Grid Leak \$1.75
3000 metor loose coupler - 11.00

Please include sufficient postage

DREYFUSS SALES CORP.
179 GREENWICH ST. N Y C T

BRASS SWITCH CONTACT POINTS

Size, 7/32x7/32
Price with 1/4-inch screw\$0.20 doz.
Price with shank and brass nut .30 doz.
Price of extra nuts for same... .10 doz.

Add Postage
Order from Ad Satisfaction Guaranteed
Immediate Delivery—Try us
STRATTON ELECTRIC COMPANY
215 Federal St. GREENFIELD, MASS

DEALERS

R
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Are you receiving our Trade
Bulletins?

KLAUS RADIO CO.

Eureka, Ill.

When Writing to Advertisers Please Mention this Magazine

"The Radio Telegrapher"

Official Organ
UNITED RADIO TELEGRAPHERS' ASSOCIATION
Room 303
24-26 Stone Street

Read about what's going on among the Commercial, Navy and Army operators

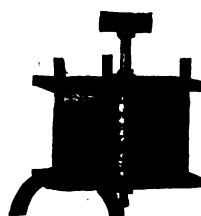
ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 yearly, 15 cents a copy

Our Tuners and condensers brought in the big fight results in great shape. They made a record. C.W. Condensers, for use up to 2000 V. now ready. 24-page catalog. New equipment. Phone, CW and receiving hook-ups now ready. Send 10 cents.



TRESCO
DAVENPORT
IOWA



SATISFACTION!



That's what the STANDARD VT BATTERY is built to give. But to get it you must insist on the genuine STANDARD VT BATTERY, without modification of the name. Refuse and return the substitute.

Type	List Price
No. 7623—Small size	\$1.50
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At last here's the outfit that makes **Summer** radio work a pleasure.

Take it out into the country and send up a few hundred feet of antennae on a Grebe Radio Kite, and surprise yourself at its range.

Find out the range of your home station.

With a canoe or rowboat, you have a ship-station that sails under the power of your kite.

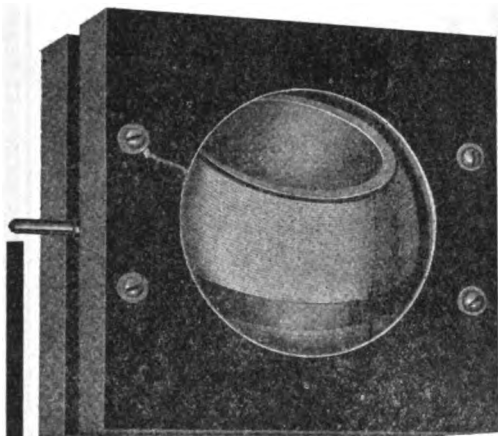
Then, when Winter comes again, merely replace the CR-5 Regenerative Receiver in its cabinet and use it in your station for real results.

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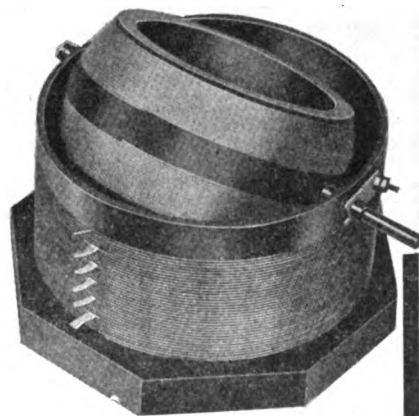
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The delicate filaments of any Vacuum Tube cannot be destroyed by excessive amperage when protected by

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SAFETY FUSE

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Slips directly on filament terminals of any standard socket without distorting springs or lowering efficiency. RADECO Safety Fuses positively protect your tubes in indefinitely.

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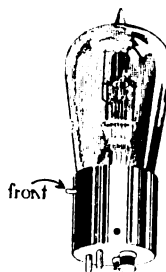
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Carrying Capacity

¾, 1, 1¼, 1½
2, 2½ and 3
amp. Size ¼
in. over all.

DIRECTIONS

For indefinite protection of your Tube slip the RADECO Safety Fuse directly on the filament terminals.

NEW APPARATUS DEVELOPED

THERE has been much excitement during the past week in the radio circles of Portland, Ore., by the completion of the first Radiotelescopograph to be manufactured by the Northwestern Radio Manufacturing Company.

It has proven after many tests to be an excellent piece of apparatus except for a few minor points, which will be adjusted in the future so that everybody will be satisfied.

Mr. William Leidigh (7ZB ex 7DS) was appointed to try out the apparatus at his station, and after locating the wave of the Lyric show house of this city, he stated that he had a very enjoyable evening.

The local theatrical managers are starting

negotiations with the Paramount Radio Laboratories of Oak Grove, Ore., for the purchase of large amounts of wave filter with which to line the walls of their theaters. They stated that the attendance has fallen off greatly in the past week. Mr. Austin (7XFR 7ZI), president of the Northwestern Radio Manufacturing Company, says he has more orders for this apparatus than he can fill at the present time.

Mr. J. D. Tait (7JW), president of Covey Motor Car Company, has placed an order for one of these sets. He is planning on demonstrating his cars by sending a car with a driver out over the hills and showing the buyers in his office the merits of the car via Radiotelescopograph. Not Advt.



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.001 and .002 Mfd. capacity
New dielectric, copper lugs
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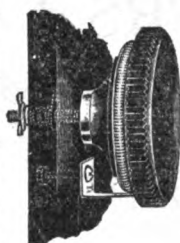
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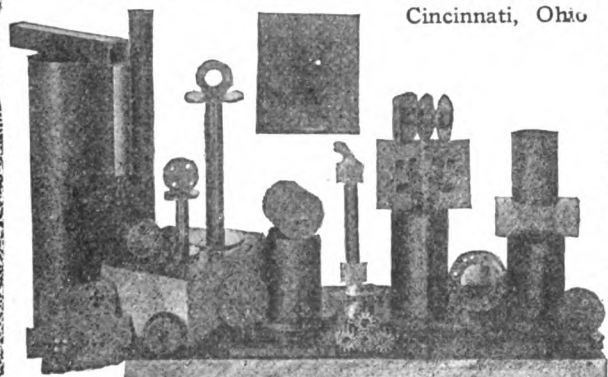
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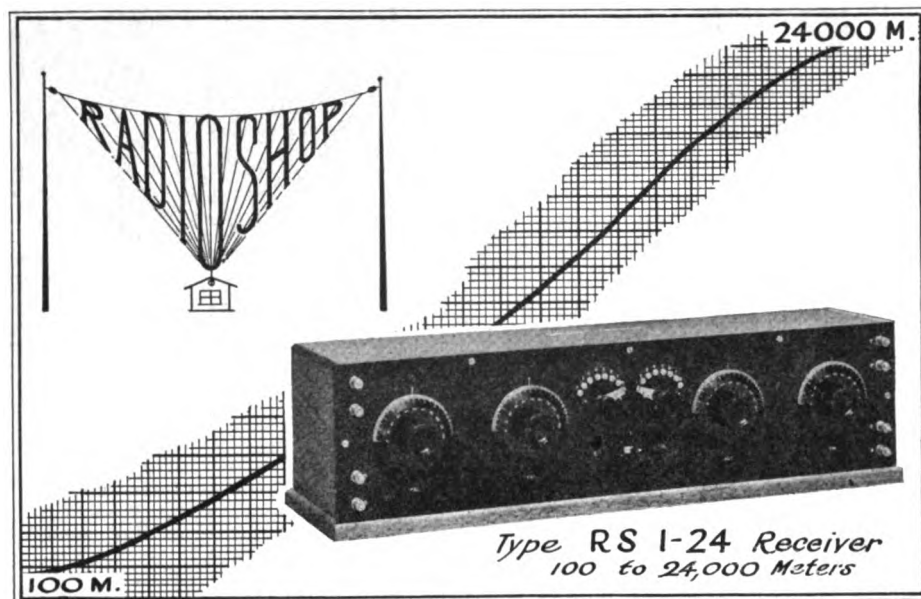


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The RADIO SHOP type "RS 1-24" RECEIVER



An original application of regenerative tuning to a receiver that covers, with the utmost efficiency, every wavelength in use today

The secret of the complete success of the "RS 1-24" receiver lies in the fact that it is not a single device covering all wavelengths but three distinct and separate combinations, all employing the unquestionably superior regenerative method of tuning.

Heretofore all multi-wavelength receivers have consisted of one form of a tuner which was usually "loaded" to reach the higher wavelengths. This method has never given complete success as the "dead end" and other self-evident losses have always decreased the efficiency on the short end of the scale, no matter what precautions, such as "dead ending" switches, have been taken to counteract it. Also it is a well known fact that the very short wavelengths require an entirely different form of tuning than can be successfully applied to the longer waves. Hence the inefficiency of "loaded" short wave receivers.

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A FEW PERTINENT FACTS ABOUT THE "RS 1-24" RECEIVER:

There is absolutely no sacrifice of efficiency on any of the wavelengths covered.

The RADIO SHOP Short Wave Receiver is the most highly efficient short wave receiver on the market. The "RS 1-24" is equally efficient on amateur wavelengths, if not more so.

Tuning is accomplished quicker, and in a cleaner manner, than in any other receiver ever built. There are no faulty "combinations." Note the simplicity of controls. Only three dials and one switch are in use on any of the three groups of tuning.

Absolutely no "holes" in the tuning range. A consistent and mighty oscillator and capable of instant non-oscillation when so desired.

The variometer principle of regeneration applied to the entire range. This fact alone speaks for the efficiency of the "RS 1-24."

Simplicity of connection to the vacuum tube control. Only four leads required, two to the grid input and two to the plate circuit.

Same vacuum tube suffices for long as well as short waves due to the remarkable flexibility of oscillation control.

An ideal receiver for C. W. and telephone work on account of the broadness of tuning available on the "stan-bi" side. Will enable you to "find" those sharp tuning tube sets.

The elimination of all plugging in and out of coils. Absolutely no other accessories required except the vacuum tube and its attendant controls.

Will enable you to hear commercial ship and marine land stations that were heretofore unheard. The 600-meter section is equally efficient as the short and long ranges.

Has a "stan-bi" position that will enable you to "find" stations that you missed entirely before.

No element of "luck" necessary for the successful operation of the "RS 1-24." It is a positive receiver designed by practical radio engineers who knew what was wanted.

Interior construction that is right, and in keeping with the exterior appearance. No Seals. We want you to know your set.

Produced and sold at the lowest possible price consistent with the best of materials and a fair profit, by systematic workmanship.

Last but by no means least, licensed under Major Armstrong's regenerative patents and applying his unapproachable circuit to its utmost effectiveness.

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Genuine Oak or Mahogany cabinets as desired. Hand rubbed finish.

All exposed metal parts satin nickel plated.

Over-all dimensions 7x7x25 inches. Shipping weight approximately 30 pounds.

The installation of the "RS 1-24" receiver will end all of your receiving troubles. You will have an instrument that will enable you to cover the entire wavelength range with a greater ease and efficiency than is possible with any other tuning arrangement you can buy or build. It will be the best investment you ever made from a financial as well as an efficiency standpoint.

Price, F. O. B. San Jose.....\$100.00

Full instructions and blue prints accompany each receiver. In ordering be sure and specify whether oak or mahogany case is desired.

San Jose

The RADIO SHOP

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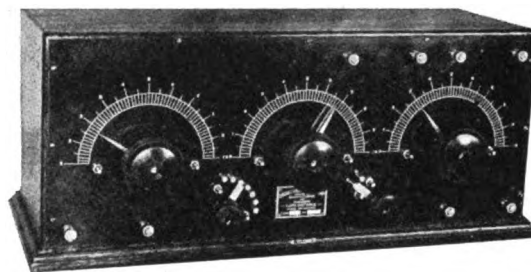
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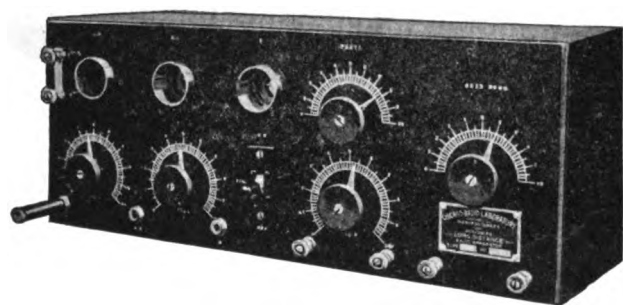
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The new type Z-Nith Regenerator equipped with long wave attachment with maximum of 1,000 meters and 180 degree coupling adjustment. The best regenerative receiver on the market today for spark, CW or radiophone reception.



Z-Nith Regenerator

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Z-Nith Amplifigon Type AG N-2

The new type Amplifigon Detector-Amplifier Type AGN-2, equipped with special high voltage cut-off switch, non-squealing amplifying transformers, variable grid condenser and plate potentiometer. Ideal for use with any tuner or regenerative receiver on the market.

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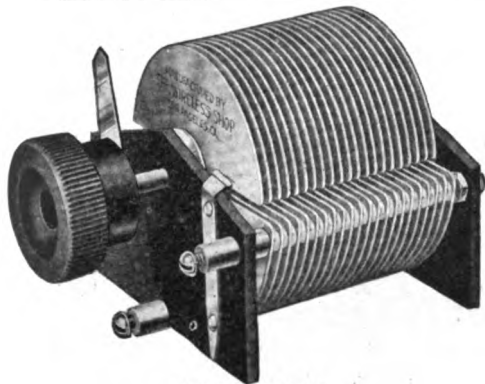
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IF YOU WANT THE **BEST**—BE SURE AND SAY—

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"WIRELESS SHOP" VARIABLE CONDENSERS are now recognized as the standard. Why are they so **POPULAR**? There's a reason—

BEST of material and workmanship—

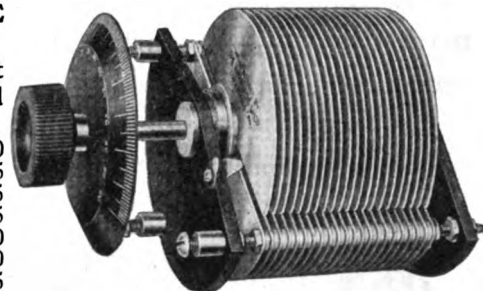
Careful inspection, and **NO COMEBACKS**. ISN'T THAT WORTH SOMETHING?

THE "WIRELESS SHOP" LINE INCLUDES EVERY TYPE OF RECEIVING INSTRUMENT

Our "Series T" variable condenser is the **IDEAL** instrument for your receiving set. Supplied with knob and pointer and mounting screws, either brass or nickel, at the following prices:

No. 20	2 plate Vernier Condenser.....	\$2.00
No. 70	7 plate, approximately .0001 m. f. maximum capacity.....	2.35
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No. 310	31 plate, approximately .0007 m. f. maximum capacity.....	4.30
No. 430	43 plate, approximately .001 m. f. maximum capacity.....	5.25
No. 630	63 plate, approximately .0015 m. f. maximum capacity.....	7.50

Include postage for one pound to your postal zone, and insurance.



SERIES "L"

IF YOU REQUIRE A HEAVIER MODEL THAN THE "SERIES T"—OUR "SERIES L" WILL FILL THE BILL. Larger plates and heavier construction throughout. Supplied with knob and pointer and mounting screws, brass or nickel.

PRICES

No. 2300	23 plate, approximately .00075 m. f. maximum capacity....	\$ 6.00
No. 4300	43 plate, approximately .0013 m. f. maximum capacity....	8.00
No. 6300	63 plate, approximately .002 m. f. maximum capacity....	10.00

Include postage for two pounds on No. 2300 condenser and for three pounds on No. 4300 and No. 6300, and insurance, to your postal zone.

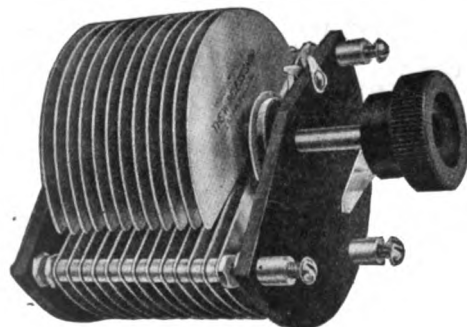
AND—OUR SERIES "CW" IS THE **ONLY** REAL CONDENSER FOR YOUR PHONE OR "CW" SET.

The plates are amply spaced to prevent spark-over on high plate potentials, and the construction is extremely rigid. With knob and pointer and mounting screws, the prices are:

SERIES "CW"

No. 1500	15 plate, approximately .0004 m. f. maximum capacity.....	\$6.00
No. 2500	25 plate, approximately .0006 m. f. maximum capacity.....	7.50
No. 3500	35 plate, approximately .0008 m. f. maximum capacity.....	9.00

Include postage for two pounds on No. 1500 condenser, and for three pounds on No. 2500 and 3500, and insurance, to your postal zone.



SERIES "CW"

IMPORTANT ANNOUNCEMENT—Watch our add next month announcing our new **VERNIER**, which may be attached to any standard "Wireless Shop" Variable. And the price is so low it will surprise you. See it next month.



511 WEST WASHINGTON STREET

LOS ANGELES, CAL.

When writing to Advertisers please mention this Magazine

PARAGON R.A. TEN

Protection Against Regrets Absolutely Guaranteed by Originator's Name



Licensed under original
Marconi & Armstrong patents

SEALS BROKEN

by popular request!

NO MORE seals on PARAGON R.A. TEN receivers,—take the panel off before you buy,—see for yourself the splendid workmanship behind the handsome cabinet,—and you will better understand the reasons for PARAGON's unequalled selectivity and amplification.

Ask your radio dealer to show you the inside construction of a Paragon. If he hasn't one in stock he will gladly get it for you.

Endorsed by prominent amateurs everywhere

SCORES of letters on file at our offices from enthusiastic amateurs, testify to PARAGON's marvellous results. The latest one as we go to press is from J. O. Smith of Valley Stream, L. I. He says, "The PARAGON R.A. TEN receiving set which has been in use at 2ZL station for the past two months has proved to be entirely satisfactory in every way, and has done everything you claimed it would do. It is remarkably efficient and selective on all wavelengths. The R.A. TEN has proved to be especially satisfactory in C.W. work, because of the complete absence of capacity effects."

OTHER amateurs have "heard stations they never heard before." A Y. M. C. A. radio school tested PARAGON in direct comparison with other leading makes, and reported that "PARAGON fulfilled every advertised superiority." Such endorsement is ample evidence that PARAGON R.A. TEN is well worth its \$85.00 price.

Descriptive folders on PARAGON R. A. TEN and PHONETRON, the improved type of loud speaker, sent free on request. Or send 25 cents for the CRECO catalogue,—listing all the worth while equipment in use today.

Satisfactory performance absolutely guaranteed

THE CONTINENTAL Radio and Electric Corporation accepts full responsibility for the satisfactory performance of PARAGON R.A. TEN receivers, as long as the internal construction remains unchanged. We cannot, of course, continue to be responsible if the design or wiring has been tampered with. In actual practice, however, the results are so surprisingly pleasing that few have any desire to make any alterations. In any case, Continental will see that you get a square deal and your money's worth.

Special opportunity to radio clubs

IF YOU are an officer or member of a radio club, you will be interested in this special offer. For a short time only, radio clubs in good standing will have the opportunity of securing a genuine PARAGON R.A. TEN regenerative receiver for their club house—**absolutely FREE**. Have your President or Secretary write on the club's letter-head for particulars **at once**.

CONTINENTAL RADIO and ELECTRIC CORP.

EXCLUSIVE WHOLESALE DISTRIBUTORS FOR PARAGON R.A. TEN AND PHONETRON

J. DiBlasi,
Sec.

Dept. G77 6 Warren Street New York City

J. Stantley,
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RADISCO BETTER "B" BATTERIES

are an investment in satisfaction! To pay less is to sacrifice essential elements of quality. To pay more is unnecessary—a needless use of money which might better be put into other apparatus.

Operating life, - 600 to 1000 hours
15 cells, - 22½ volts

No. 1 (3½ x 2 x 2½ in.) - \$1.50

Shipping weight 2 pounds

No. 2 (6½ x 4 x 3 in.) - \$2.65

Shipping weight 5 pounds

Larger size has variable voltage feature. Tapped in groups of three cells. Ask your dealer to explain it.

For radio phone work, Radisco Better "B" Batteries provide a reliable source of power, without the disagreeable hum of a motor generator or the rectified 60 cycle tone

Radio Distributing Co.
Newark New Jersey

This Mark



Your Guarantee

No batteries at the price are as good.

No batteries at any price are better.



THE RADIO DEAL-
ers listed below are
progressive merchants.
They are equipped to give
you helpful advice and
real service in selecting
your radio equipment. As
an indication of their up-
to-date methods, they
carry a complete line of
Radisco apparatus, includ-
ing the new vario-coupler,
Radisco Coils, Better "B"
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etc. Buy from the nearest
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If you are in a town where
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RADISCO

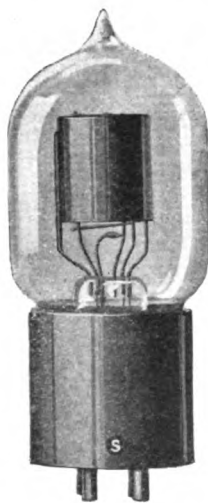
"Your Assurance of Satisfactory Performance"

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

Do You Know WHY

the new Westinghouse Receiving Equipment was designed
solely for use with A-P Tubes?

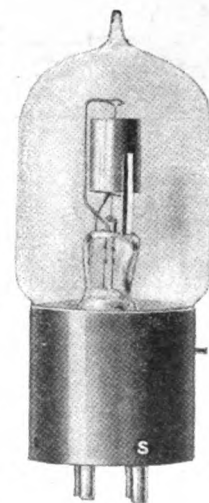


THE A-P
Electron Relay
New Price
\$5.00

After the most exhaustive tests in their laboratories at East Pittsburgh, the Westinghouse Research Department found that the **A-P Tubes** were the most efficient tubes on the market today—for regeneration—for amplification—for detection.

A-P Tubes proved to be the most quiet in operation and gave the loudest received signal strength. **A-P Tubes** also proved the most economical in filament consumption, requiring only half the A battery consumed by competitive tubes.

A-P Tubes are the pioneer tubes on the market today. They have passed the experimental stage and are a proved success. They have the highest base insulation of any tube on the market and are the result of the design of the British, French and American Governments, under the rigorous specifications of military requirements. It is not surprising that **A-P Tubes** are approved and adopted by the Westinghouse Electric and Manufacturing Company.



THE A-P VT
Amplifier-Oscillator
New Price
\$6.50

For the best book on Radio, ask your dealer
for "*Elements of Radiotelegraphy*,"
by Lieut. Ellery W. Stone, U. S. N.,
or order direct from...

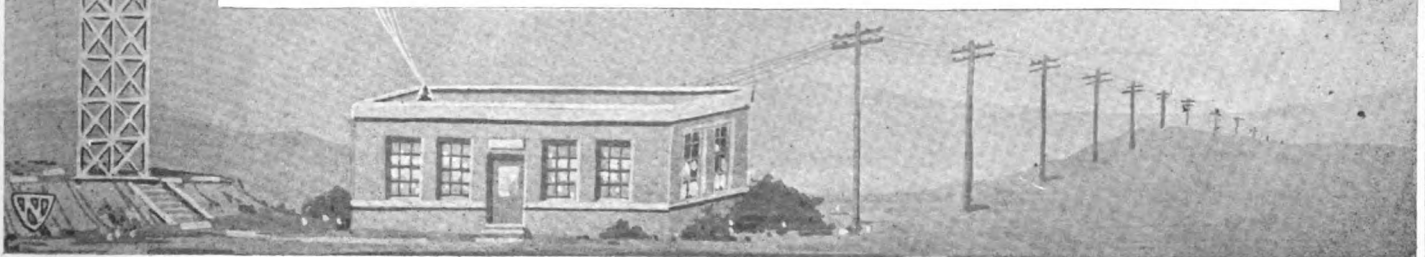
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TUBES MEET EVERY AMATEUR REQUIREMENT

The trade-mark GE is the guarantee of these quality tubes. Each tube is built to most rigid specifications.



	C300 Gas Content Detector	C301 Plotron Type Amplifier	C302 5 Watt Power Tube	C303 50 Watt Power Tube	C304 250 Watt Power Tube
Filament Terminal Voltage.....	5 V.	5 V.	7.5 V.	10 V.	11 V.
Filament Supply Voltage.....	6 V.	6 V.	10 V.	12 V.	12 V.
Filament Current.....	1.0 amp.	1.0 amp.	2.35 amp.	6.5 amp.	14.75 amp.
Plate Voltage.....	18 to 25 V.	40 to 100 V.	350 V. normal	1000 V. normal	2000 V. normal
Plate Current.....	$\frac{1}{4}$ to 1 milli. amps.	1 to 5 milli. amps.	.045 amp.	.15 amp.	.25 amp.
Output Impedance.....	10,000 ohms	21,000 ohms at 40 Volts 14,000 ohms at 100 Volts	4,000 ohms		6,000 ohms
Amplification Constant.....		6.5 to 8 at 40 V. 8 to 10 at 100 V.	7.5	10	25
Watts Output.....			5 normal	50 normal	250 normal
Dimensions (overall).....	1 $\frac{3}{4}$ "x4 $\frac{1}{16}$ "	1 $\frac{3}{4}$ "x4 $\frac{1}{16}$ "	2 $\frac{1}{8}$ "x5 $\frac{1}{4}$ "	2"x7 $\frac{1}{2}$ "	5"x14 $\frac{1}{2}$ "
Base.....	4 Prong Standard	4 Prong Standard	4 Prong Standard	4 Prong Special	Special Mounting
PRICE.....	\$5.00	\$6.50	\$8.00	\$30.00	\$110.00



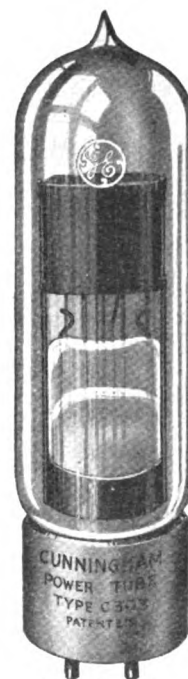
Cunningham
Amplifier
C-301



Cunningham
Detector
Gas Content
C-300



Cunningham
C-302
5 Watt Power Tube



Cunningham
C-303
50 Watt Power Tube



Cunningham
C-304
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DEALERS: Standard Packages F. O. B. Cleveland, San Francisco, Chicago, New York. Broken Packages F. O. B. San Francisco and Chicago.

E. T. CUNNINGHAM

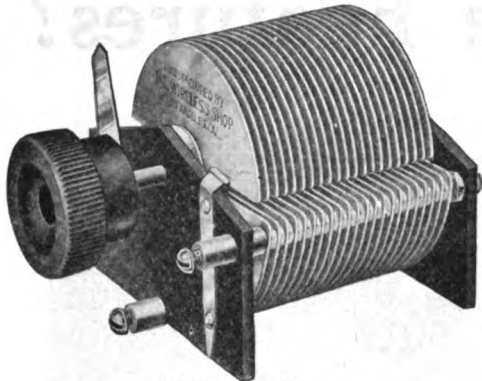
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Since 1915

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Herbert H. Frost, Central and Eastern Representative, 154 West Lake St., Chicago, Ill.

QUALITY OR PRICE?

Which are You interested in?



SERIES "T"

WOULD YOU RATHER TAKE AN INFERIOR INSTRUMENT AND SAVE A FEW CENTS—OR—PAY A LITTLE MORE AND GET THE BEST?

IF YOU WANT THE **BEST**—BE SURE AND SAY—

"WIRELESS SHOP PRODUCTS"

"WIRELESS SHOP" VARIABLE CONDENSERS are now recognized as the standard. Why are they so popular? There's a reason—

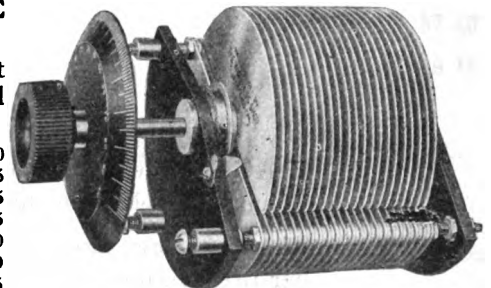
BEST of material and workmanship—

Careful inspection, and NO COMEBACKS. ISN'T THAT WORTH SOMETHING?

THE "WIRELESS SHOP" LINE INCLUDES EVERY TYPE OF RECEIVING INSTRUMENT

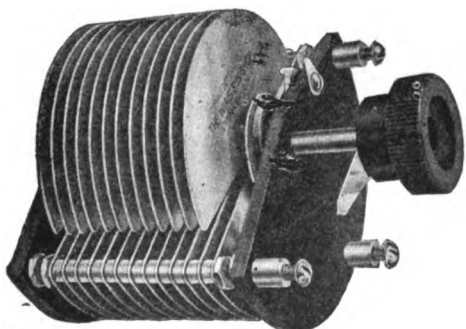
Our "Series T" variable condenser is the IDEAL instrument for your receiving set. Supplied with knob and pointer and mounting screws, either brass or nickle, at the following prices:

No. 20	2 plate Vernier Condenser	.....\$2.00
No. 70	7 plate, approximately .0001 m. f. maximum capacity	..... 2.35
No. 130	13 plate, approximately .0002 m. f. maximum capacity	..... 2.75
No. 170	17 plate, approximately .0003 m. f. maximum capacity	..... 3.15
No. 230	23 plate, approximately .0005 m. f. maximum capacity	..... 3.60
No. 310	31 plate, approximately .0007 m. f. maximum capacity	..... 4.30
No. 430	43 plate, approximately .001 m. f. maximum capacity	..... 5.25
No. 630	63 plate, approximately .0015 m. f. maximum capacity	..... 7.50



SERIES "L"

IF YOU REQUIRE A HEAVIER MODEL THAN THE "SERIES T"—OUR "SERIES L" WILL FILL THE BILL. Larger plates and heavier construction throughout. Supplied with knob and pointer and mounting screws, brass or nickel.



SERIES "CW"

PRICES

No. 2300	23 plate, approximately .00075 m. f. maximum capacity	.....\$ 6.00
No. 4300	43 plate, approximately .0013 m. f. maximum capacity	..... 8.00
No. 6300	63 plate, approximately .002 m. f. maximum capacity	..... 10.00

Include postage for two pounds on No. 2300 condenser and for three pounds on No. 4300 and No. 6300, and insurance, to your postal zone.

AND—OUR SERIES "CW" IS THE **ONLY** REAL CONDENSER FOR YOUR PHONE OR "CW" SET.

The plates are amply spaced to prevent spark-over on high plate potentials, and the construction is extremely rigid. With knob and pointer and mounting screws, the prices are:

SERIES "CW"

No. 1500	15 plate, approximately .0004 m. f. maximum capacity	.....\$6.00
No. 2500	25 plate, approximately .0006 m. f. maximum capacity	..... 7.50
No. 3500	35 plate, approximately .0008 m. f. maximum capacity	..... 9.00

Include postage for two pounds on No. 1500 condenser, and for three pounds on No. 2500 and 3500, and insurance, to your postal zone.

IMPORTANT ANNOUNCEMENT—Watch our ad. next month announcing our new VERNIER, which may be attached to any standard "Wireless Shop" Variable. And the price is so low it will surprise you. See it next month.

THE WIRELESS SHOP

A.J. EDGCOMB

511 WEST WASHINGTON STREET

LOS ANGELES, CAL.

What Other Receiver Has *These* Features?

In the



CR-8 Short-Wave Receiver



Licensed
Under the
Original
Armstrong
Patents.

EACH element is shielded with a grounded, aluminum plate, thus eliminating troublesome change of frequency when tuning on C. W.

There are new, moulded variometers that will last a century. And new, rubber-tired verniers of a kind that make *real* tuning a pleasure.

Wave-change and rheostat control wheels give visual indications of the wave-length range and the resistance in the filament circuit.

Filament and plate battery binding posts are conveniently mounted for connecting through the back of the cabinet. This eliminates unsightly connections.

And—its range is 150 to 1,000 Meters.

The amateur who wants to "be somebody" this Fall will appreciate these features. What is far more important, he will appreciate the *results* this receiver will give him.

Your dealer will gladly order one of these Receivers for your inspection. Ask him for bulletin.

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Central Radio Company Inc., Kansas City, Mo.
Continental Radio and Electric Corp., New York.
Detroit Electric Co., Detroit, Mich.
Doubleday-Hill Electric Co., Pittsburgh, Pa.
Electrical Specialty Co., Columbus, Ohio.
Holt Electric Utilities Co., Jacksonville, Fla.
Hurlburt Still Electrical Co., Houston, Texas.

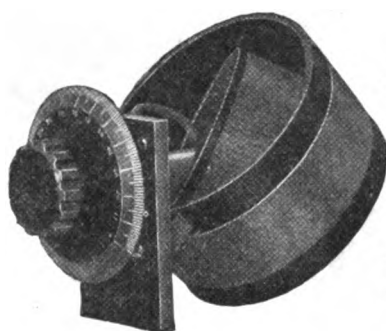
Hickson Electric Co., Inc., Rochester, N. Y.

Kelly and Phillips, Brooklyn, N. Y.
Klaus Radio Company, Eureka, Ill.
Manhattan Electrical Supply Co., New York, Chicago, St. Louis
Leo J. Meyberg Co., San Francisco, Cal.
Newman-Stern Co., Cleveland, Ohio.
F. D. Pitts Co., Inc., Boston, Mass.
Philadelphia School of Wireless Telegraphy, Philadelphia, Pa.
Western Radio Electric Co., Los Angeles, Cal.

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A NEW KENNEDY VARIOCOUPLER

Another Mark of Progress



Possesses many outstanding features, among which are:

1. Coupling variable progressively through an arc of 180 degrees.
 2. Pigtailed connection to rotor. No sliding contacts.
 3. Secondary mounted concentrically within primary.
 4. Primary inductance provides for single turn variation.
 5. Light and compact but strong and rugged. (Weight only 12 ounces.)
 6. Highest grade materials. Made of formica, brass and double cotton covered copper wire.
 7. Minimum solid dielectric in electromagnetic field.
 8. PRICE \$7.50
- With Kennedy bakelite knob and dial as illustrated 8.75

THE COLIN B. KENNEDY COMPANY
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RIALTO BUILDING

SAN FRANCISCO

MAKE A COMPARATIVE TEST

Have your dealer hook up the Radio Magnavox and any other so-called loud speaker in the world: use enough magnification to give good strong signals: use the same horn on both instruments and test them out one against the other. Give them both a fair test, and we know which one will come out ahead.

The RADIO MAGNAVOX

because of its construction, cannot chatter nor distort signals. It cannot get out of adjustment and it now takes the very small amount of one ampere in its field windings. It must always be remembered that the RADIO MAGNAVOX faithfully reproduces the impulses it receives, and some of the old radio amplifiers distort in their amplification — this, of course, cannot be charged to the MAGNAVOX, but is a characteristic of the amplifier.

**MAKE A COMPARATIVE TEST, AND YOU WILL BUY THE
RADIO MAGNAVOX**

PRICE ONLY FORTY-FIVE DOLLARS

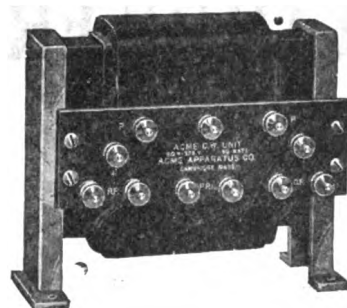
Then you will be one of the 2000 MAGNAVOX fans who have the satisfaction of knowing that they have the best and only true loud speaker for radio work. **"THE WORLD'S STANDARD"**

MANUFACTURED BY

THE MAGNAVOX COMPANY

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New York Office: Penn-Terminal Bldg., 370 7th Ave., New York City

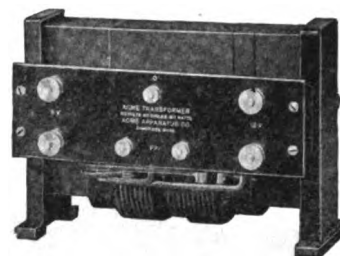


C. W. Power
Transformer

Before buying any
C. W. APPARATUS

Ask for ACME Bulletins

They contain valuable information and will help you to install an efficient C. W. station.



Filament Heating
Transformer

ACME C. W. APPARATUS

ACME Guaranteed APPARATUS

C. W. Power
transformers

Filament heating
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Choke Coils

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transformers

Modulation
transformers

Amplifying
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Amplifiers
Detectors

ANYONE having an alternating current can easily have a radio telephone and telegraph station.

No storage batteries or motor generator required.

Filaments lighted by filament heating transformers.

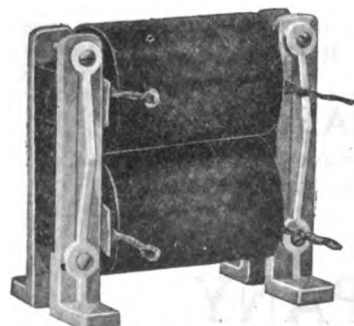
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Such a station is entirely satisfactory. No moving parts to require attention. Plenty of power available. No noise.

Acme has the most complete line of C. W. apparatus. There is a specially designed Acme instrument for every special need. Use Acme apparatus thruout for smooth-working, dependable performance and high efficiency.

THE APPARATUS WITH THE GUARANTEE

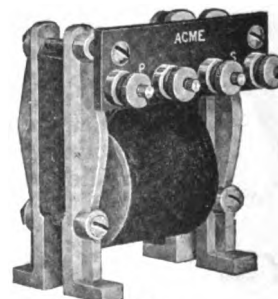


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ACME APPARATUS COMPANY

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Transformer and radio engineers and
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A2 Amplifying
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PACIFIC RADIO NEWS





PAUL R. FENNER
Editor
LAWRENCE MOTT
Assoc. Editor
H. W. DICKOW
Advertising Manager
151 Minna Street,
San Francisco, Cal.
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close on Sept. 1st

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By the Editor

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the U. S.
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Countries
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Pacific Radio Pub. Co.

KEEPING AMATEUR RADIO HERE

SOME of you men close under the "wings" of the radio inspectors of the various nine districts never realize what is being "got away with" out in the little corners of the United States where radio inspectors are not manifest. Buzz, scratch, squeak; it's the old-time plain aerial spark coil bug on the job without a license. But we are broad-minded; we know this little pest is undoubtedly a young boy "crazy" to talk via radio, and, unable to secure a license, goes ahead without one, little realizing he is breaking the Federal law.

A lot of us are broad-minded, in fact, too much so. We refer to the man who has a nice set, properly tuned, a license and everything, and who communicates by radio with the unlicensed station. But, look here, read this reason: If you are going to talk to an unlicensed amateur, you are encouraging him to operate without a license. Further, you are violating the law in doing so, and it isn't healthy.

But, getting down to the fundamental idea of this RADIOTORIAL, it's KEEPING THE AMATEUR HERE. We don't want legislation that will kill the amateur game; further, we don't want laws any more stringent than the present ones on Amateur Radio. If you agree with our opinion, then DO YOUR SHARE.

At the present date amateur radio is increasing, and stations are being licensed at a tremendous rate. That means that interference is being increased proportionately. The biggest, and almost only argument the legislators can bring against Amateur Radio, is just that one thing—INTERFERENCE. All right, then let's cut INTERFERENCE down. The body of licensed amateurs about the country are to be praised, in general, for their intelligent manipulation of their ap-

OUR NEW ADDRESS

"Pacific Radio News" is now being printed in our co-operative plant at 151 Minna Street San Francisco.

Please use our new address in your correspondence to us.

Four additional pages and a better cover, as well as a marked improvement in the nature of reading matter, are the outstanding features of this number.

The October issue will be better than ever. Don't miss a single copy of the future numbers. A subscription is your best insurance against missing much valuable and heretofore unpublished data that we have in store for you.

paratus to give pure and sharp waves, which minimize interference.

But, coming back to the spark coil or the unlicensed station, in general, let's weed him out entirely. "Spare the rod and spoil the child" is a slogan for application to unlicensed set operators. Unless he is shown that he must cut out the transmitting he will get unmanageable and will ruin radio for the rest of us—law-abiding citizens that we are.

How to go about it? This way: First of all, don't think of bothering to tell him, over the air, that you will report him to the radio inspector; no, that's like "telling mamma." In the first place you have no business to talk with the unlicensed station, and in the second place the offender, being out of "fist reach," refuses to obey his reprimand. The way to get him is to let him

"rave" on for several nights, or weeks, and try to locate him. The simplest way, but not the most effective, is to go to all your different friends and listen in for this "bug," and by comparing audibility or loudness of his signals, and finding his approximate location, run him down by finally finding his antenna. If you are lucky, you can hear him give his address to some friend offender, and thus have no trouble. Then there is a third method—the most interesting, and one which will be remarkably effective. This is by using a coil or loop antenna, as used in a radio compass station, and by securing the assistance of one other station. A map of the city or country should be procured, the distance between the two stations calculated, or measured, and by securing two angles, observed while receiving from the unlicensed station, the exact position the unlawful "bird" is occupying on the map is found. The rest is easy.

Then, when you've "got" him, what to do with him? Call on him, introduce yourself, tell him why you called and ask him whether he doesn't think he ought to stop taking the law in his own hands. Cases such as these must be handled diplomatically, gentlemanly and not in a spirit of superiority. If the "unlicensee" is a young boy and appears particularly insistent to continuing operation, try explaining to his parents what the boy is really doing—disobeying Federal law.

The last resort should be to report an offender to the government, namely, the radio inspector. If the right kind of treatment is given the last resort will be unnecessary.

Such work among us of the licensed amateurs will assist the government in keeping radio laws in observance and will be one big block in the building of permanent legislation, allowing amateurs to operate without fear of impending curtailment.

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

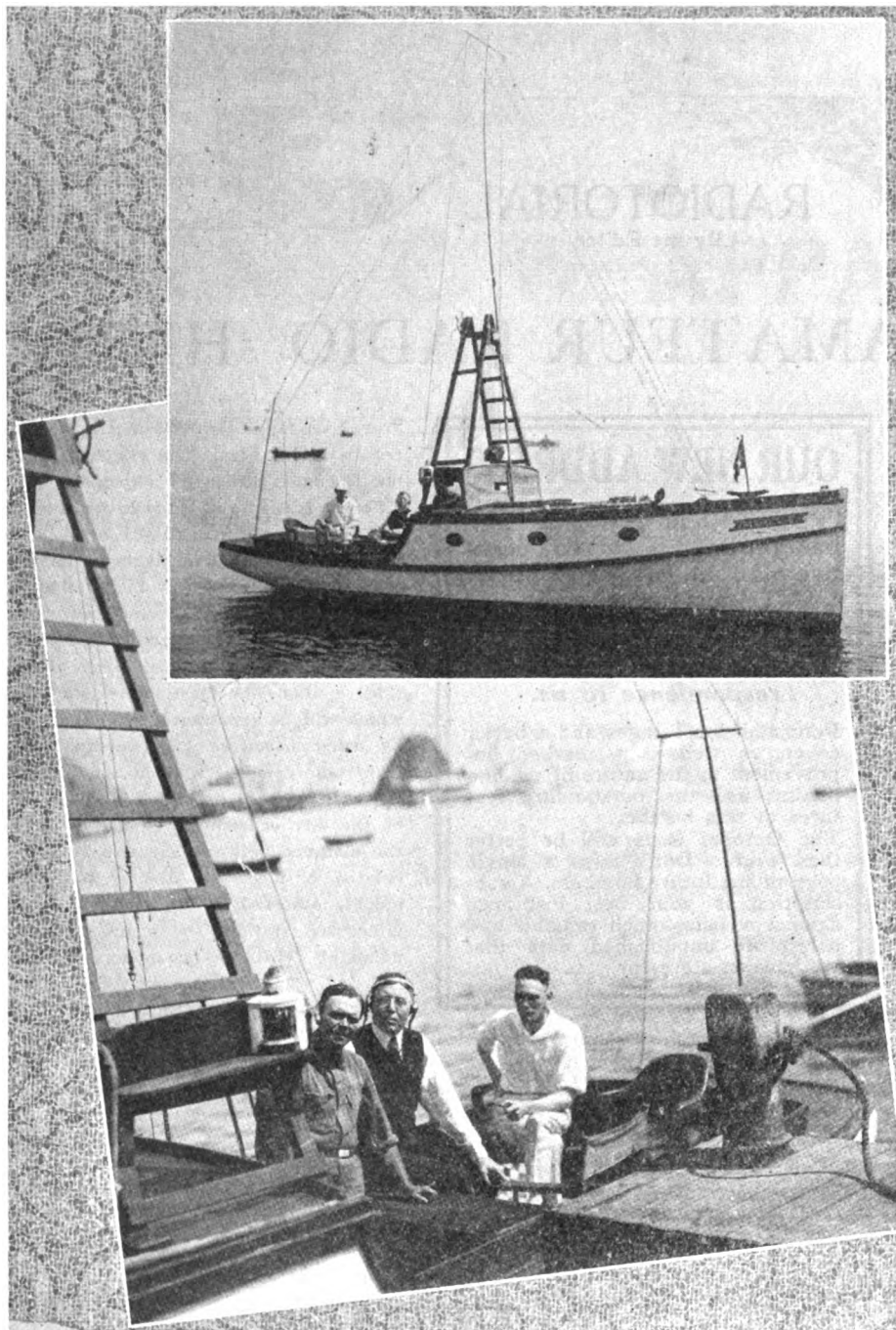
Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1300 Hartford Bldg.

Seattle Office.....419 Pioneer Bldg.
London Office....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

WIRELESS AS AN AID TO PLEASURE

Below we have a photo of Mr. Lawrence Mott's wireless-equipped fishing boat, "Mable F." The equipment has already proven its worth, not only from a standpoint of pleasure but from a practical nature as well. Mr. Mott wears the receivers almost constantly while on a fishing trip. The "folks at home" put in a call for the mainland via the Avalon radio telephone and the message intended for Mr. Mott is spoken to the party on the other end of the line. In the lower photo U. S. Radio Inspector Major J. F. Dillon is seen "listening-in" to the Avalon radio telephone. To the left of the Major is our Associate Editor, Mr. Lawrence Mott.



Description of set on U. S. Deputy Game Warden, Lawrence Mott's fast fishing cruiser, the "Mable F"—from which he has killed many record swordfish and tuna in Southern waters.

Antenna: Rigged as shown in photograph—No. 14 soft-drawn copper—50' in length, all told. The receiver consists of a Remler panel amplifier—1 tube—operating in conjunction with very sensitive variometers. By the aid of a separate coil in the antenna he gets up to 600 meters, and has excellent audibility while at sea, fishing, up to dis-

tance of 150 miles—that is unusually good, when the comparative size of the antenna is considered. While after tuna, in the Santa Barbara Channel, Mr. Mott has heard amateur stations in Los Angeles and the surrounding country. The radio telephone between Avalon and the main land is QSA almost everywhere among the Channel Islands—Santa Cruz, San Miguel, San Clemente, etc. An effective ground is obtained by making fast a lead to the frame of the engine—thus connecting, through the shaft, directly to the water.

CURRENT ILLUS

S.S. ALASKA'S RADIO BRINGS HELP TO DOOMED VESSEL



The radio hero of the "Alaska"

JOHN J. MICHELSON is the radio hero of the ill-fated "Alaska," which went to her doom on Blunt's Reef, August 6th, in a dense fog. The general public has learned little of the radio operators and the manner in which they conduct themselves while the grim reaper of death took with him more than a score of the passengers and crew of the doomed vessel.

Newspaper reports were loud in their praise of the many heroes of the day—but what was said about Michelson? Practically nothing! Were it not for the manly courage of the radio man in the performance of his duties the casualty list would, no doubt, have been swelled.

Michelson was on watch when the ship crashed into the reef. The second officer rushed into the radio cabin with instructions to send distress signals. The captain followed the second officer with similar instructions. SOS calls were intercepted by the S. S. "Anyox" and the S. S. "Wahkeena," as well as by the Radio Corporation station at Bolinas, Cal. The engine room was flooded soon after the vessel struck. Michelson states that power from the emergency radio batteries enabled him to communicate for almost 15 minutes with the "Anyox." So rapidly did the vessel sink that the radio room was soon flooded with water and communication was interrupted.

The radio operator stuck to his post until the last possible moment. Only a handful of the crew and passengers were now aboard. The last life raft was being launched just as Michelson was leaving the radio room. Together with the second operator, A. G. Peery, he boarded the last raft, under instructions from the chief officer, and six hours later the majority of the survivors were safely aboard the "Anyox."

The radio equipment of the "Alaska" was of the Kilbourne and Clark manufacture, controlled by the Ship Owners' Radio Service.

RADIO NEWS RATED

RADIO ON SAILING SHIPS

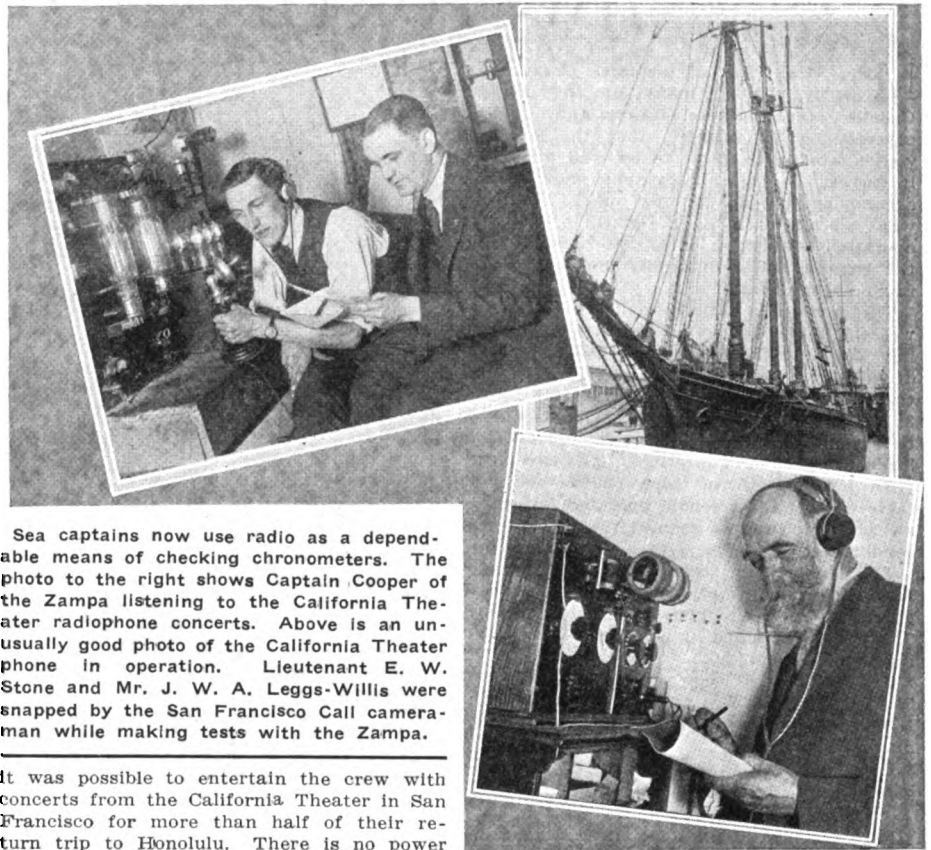
EARLY in the month of June of this year the sailing schooner *Zampa* arrived in San Francisco with a cargo of copra from the Hawaiian Islands. The *Zampa* is owned by the Hon. Henry E. Cooper, former Judge of the Federal District Court of Hawaii, and was purchased by him in Honolulu early this year.

On arrival in San Francisco Judge Cooper arranged with the Pacific Radio Supplies Company, local distributors for the De Forest Radio Telephone and Telegraph Company, to have a complete receiving set installed on this ship, the main object being to receive time signals while at sea for checking the ship's chronometers. The necessity for the absolute accuracy of these instruments, in order to find the ship's position, is obvious. The engineers of the Pacific Radio Supplies Company installed a DeForest multi-wave tuner and a combination detector and amplifier panel.

While in San Francisco Judge Cooper became interested in the numerous radio concerts being broadcasted daily, and so added to his installation a loud speaker horn with microphone attachment. With this addition

Sea captains now use radio as a dependable means of checking chronometers. The photo to the right shows Captain Cooper of the *Zampa* listening to the California Theater radiophone concerts. Above is an unusually good photo of the California Theater phone in operation. Lieutenant E. W. Stone and Mr. J. W. A. Leggs-Willis were snapped by the San Francisco Call camera-man while making tests with the *Zampa*.

It was possible to entertain the crew with concerts from the California Theater in San Francisco for more than half of their return trip to Honolulu. There is no power supply on board this ship, the installation being entirely dependent on the 140-ampere



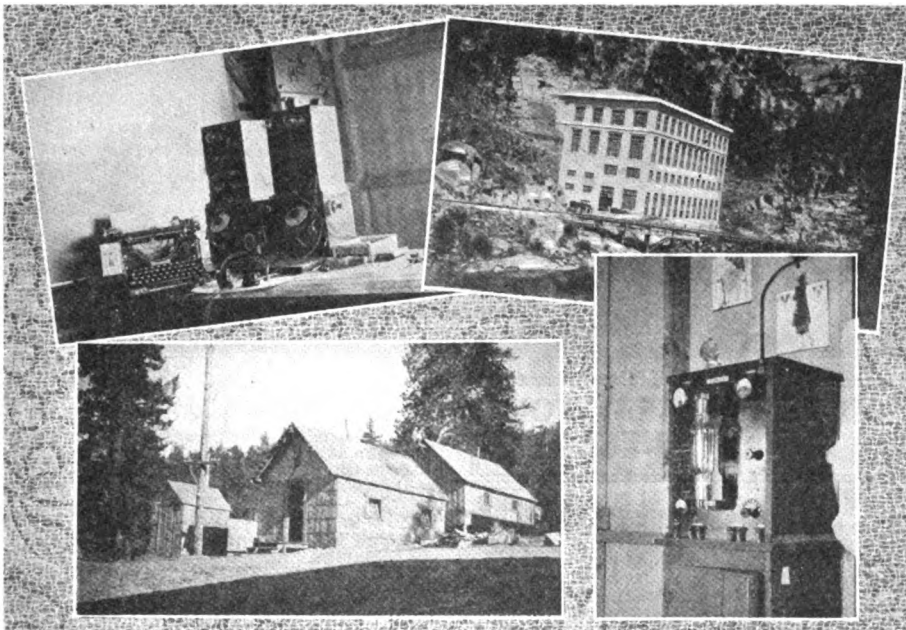
C. W. STATION AT BIG CREEK

By S. E. HYDE

WITH headquarters at Big Creek, California, 40 miles up in the mountains, from Fresno, Calif., there is going forward a

geles and vicinity at a pressure of 150,000 volts. A third is under construction. Big Creek, at an altitude of 5000 feet, is con-

Exide battery, known as the "Submarine Special." The antenna consists of two wires rigged between the main mast and mizzen, a spread of about 30 feet, with 140-foot lead-in thru the deck into the cabin. Judge Cooper was easily able to operate this set without any previous radio experience and is now considering the installation of complete radio telephone equipment for his ship.



hydro-electric project on a large scale by the Southern California Edison Company of Los Angeles. Two large power-houses have already been completed in the Big Creek Gorge and are shooting "juice" to Los An-

ected by telephone and telegraph directly with the Los Angeles offices.

Two thousand feet higher, at the further end of Lake Huntington, lies Camp 60, the lower terminus of a 13-mile tunnel which

will bring water from Florence Lake through a 9,000-foot mountain (Kaiser Pass) into Lake Huntington. Half way to Florence Lake on an angle with the tunnel survey lies Camp 61, where an "Adit" is being cut into the mountain side so that work on the tunnel may be pushed forward from both ends and also in the middle, thus expediting its completion.

Up in this country winter starts about September, with snow falling, and continues through to April. During this time it was found impossible to keep up telephone lines, due to storms, snow and ice.

The Edison engineers decided that CW transmission was the only thing that would enable reliable communication to be kept up with Big Creek between Camp 60 and Camp 61. In winter the only means of communication with the exception of radio is a dog team, as the roads are buried deep in snow.

The three radio sets are identical at each station. The transmitter consists of a 1/2 KW DeForest Oscillon Transmitter. A 1500 volt DC generator supplies the plate current and a 37 volt DC generator feeds the filament of the Oscillon tube. Voice modulation by telephone transmitter can be employed, but telegraphic operation is much quicker and more reliable.

These sets are supplied with energy from a 30,000 volt transmission line running from Big Creek, which also furnishes energy for (Continued on Page 71)

7JW- PORTLAND, OREGON

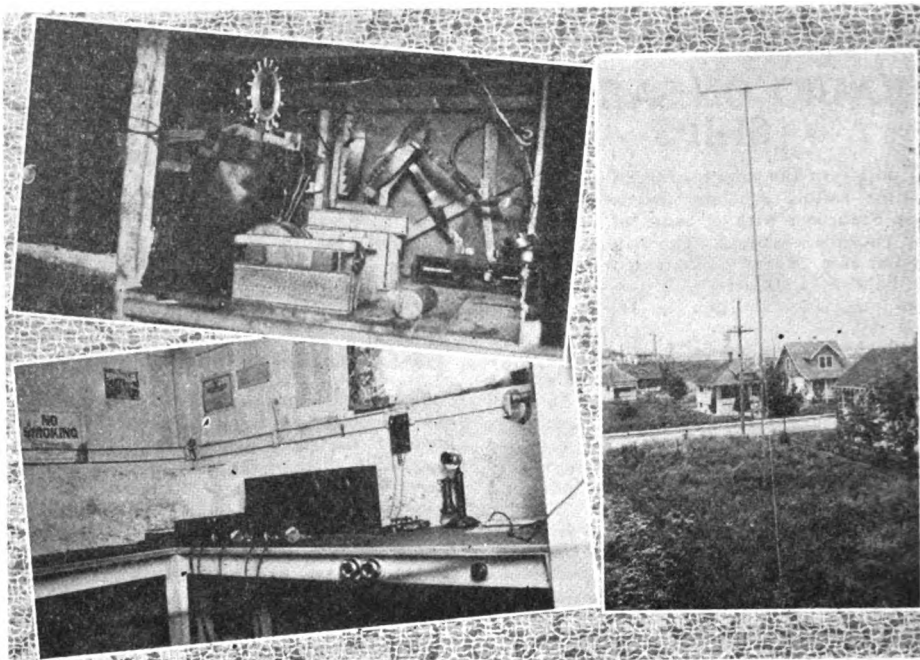
MR. JACK TAIT of Portland, Oregon recently visited many of the Pacific Coast's "star" amateur stations and has discovered, to his surprise, that the stations visited are in no respects as well arranged in reality as the photographs show. The accompanying illustrations of 7JW show what his station looks like when it is in full operation—not when it is "re-vamped" for the camera and sent on its journey to the radio publications.

The receiver is entirely made up of Northwestern Radio Mfg. Co. apparatus, consisting of a regenerative receiver and two steps of amplification. The receiving set and transmitter controls are in a small room, 8x10 ft., while the transmitter is placed at the other end of the house to facilitate short leads and ground connections. The two large push buttons on the edge of the receiver table control the solenoid operated antennae switch, which can be seen at the right of the sending set.

The transmitter consists of a homemade 1 K. W. transformer, pancake O. T., glass plate condenser and non-synchronous rotary. The tone is obtained by a 16-point disc turning up 1750 rpm.

The aerial is 62 feet at the high end and 54 feet at the lead-in end. It is a four-wire L. The lead-in comes directly down into the magnetic switch.

Because his spark is not heard every night, is no sign that he's not on the job.



THE "WESRAD" RADIO TELEPHONE STATION

A Powerful Los Angeles Tube Set that radiates two and one-half amps

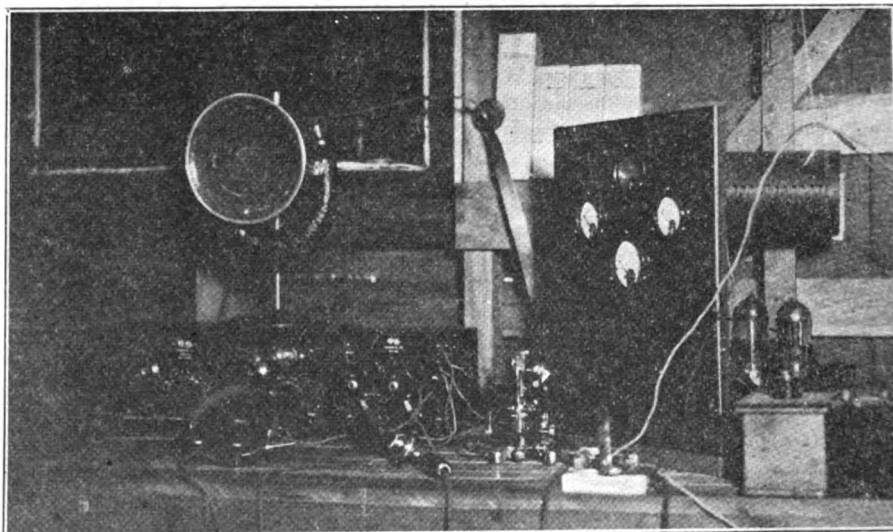
RADIO Station 6XD, operated and controlled by the Western Radio Electric Company, 550 South Flower Street, Los Angeles, Cal., is now transmitting radio telephone concerts every Tuesday and Friday evening between 8 and 9 o'clock.

A specially constructed transmitter is used which employs two Cunningham 50-watt tubes, one as an oscillator and the other as a modulator. The Colpitts oscillator circuit in conjunction with the Helsing system of modulation seems well adapted to this type of transmitter.

At present, with 850 volts on the plate and a total space current of 200 milliamperes the radiation is 2½ amperes on 325 meters. A few changes will probably be made in the power input shortly which should materially increase the radiation.

Arrangements have been made with Richardson's Music Shop in Los Angeles to furnish all the latest Victor Records as soon as they are ready for distribution so the concerts have the added attraction of being of assistance in selecting new records for the listener's own phonograph.

Although the concerts have been held for only two weeks, and practically no announcement has been made of them, the music has been reported very clear in San Diego, Santa Barbara, Walnut Grove (6ZX), Oakland, and also in practically all the nearby towns. This is really excellent work considering the fact that it requires sharp tuning to find that "melodious meter" and much better records are expected as soon as the concerts become generally known.



HAVE YOU SENT FOR YOUR PRIZE?

Mr. W. H. Klrwan of Davenport, Iowa, who so successfully conducted the Washington Birthday Relay, has informed us that several of the Pacific Coast winners of the contest have not as yet sent for their prizes. The following is a list of winners in the fifth, sixth and seventh districts:

Leander L. Hoyt and friends, Hayward, Cal.; Cipp Eastman ZRF Reg. Receiver.
Miss Winnie Dow, Tacoma, Wash., one baby carriage, or if she does not need it just yet, she can have the Navy Type Tuner, donated by Sears Roebuck & Co., of Chicago and Philadelphia.
M. S. Andelln, Richfield, Utah, gets the of Pasadena, Cal., received the same type of Chicago Radio Lab. Zenith Generator.

N. Hood, Casper, Wyo., gets the Grebe CR3A Regenerative receiver.

H. Berringer, Burlingame, Cal., gets the two-step Amplifier from Montgomery Ward Co., of Chicago and Kansas City. This will help him to get even better signals from the east.

F. Mahr, San Francisco, Cal., 1 0-1 HW Eldridge Meter; donated by J. Firth Co.

J. Martin, Amarillo, Texas, 1 0-1 HW Eldridge Meter; donated by J. Firth Co.

R. Willson, Portland, Ore., 1 No. 3 Condenser with dial; donated by Chelsea Radio Co., Chelsea, Mass.

Rev. Father Burns, Marshall, Texas, 1 pair Baldwin-Brownlee type phones.

M. Powell and D. Culbert, both of Warren, Arizona, received each a UV 200 bulb, donated by the Radio Corporation of America. R. Taggart and F. Weyerhauser, both tube, as well as R. Scott, of Douglas, Arizona.

(Continued on Page 62)



ROBERT GARCIA, 7-year-old son of Allen Garcia, director for Charlie Chaplin, is the youngest licensed radio operator in the world. Official confirmation of his success in passing the amateur operator's examination with a percentage of 92 was recently received from Major J. F. Dillon, U. S. Radio Inspector at San Francisco.

Mr. Allen Garcia has released the following statement for publication in "Pacific Radio News":

From the time that his father took an interest in radio (November, 1920), Robert would read the catalogues and manufacturers' advertisements which most every aspirant to the realm of Radio is inevitably equipped with, he would ask father some then rather embarrassing questions regarding hookups and frequencies, oscillations, amplifications, and such many other things that poor father then could not answer, that made the latter sit up nights and study till early morning so as not to fall in the estimation of his son; for to his son, he, the now erstwhile 6BJ, was Mr. Allan Garcia-Hertz-Marconi-Bellini-Armstrong, et al, and everything that meant anything in the evolution and construction of radio. Along about that time father put away the crystal and loose coupler in favor of vacuum tubes. Robert took an interest in the discard, and while father was away would dissect the coils to see how they were made, and would try to hook them up in every manner conceivable, not even overlooking the electric iron or the vacuum cleaner, fuse blocks on the lighting circuit or the door bell. In fact, he left nothing undone, but he still had a lot to learn. Then he hit upon the idea that if father would let him listen on his set he would learn the code and be able to copy. So father turned the set over to him in the day time with the understanding that he learn the code first by heart in two days. Within 24 hours he accomplished that, and later would sit for hours till he heard someone sign at a speed that he could copy. He was a little stickler, remaining at the set for three or four hours at a stretch. Later, when father took out a license and was assigned a call, Robert's interest was increased 'till he had to be shown the workings of every part of the transmitting set and given a concise explanation of everything, including circuits. For several days the lad went around drawing circuits on the back of everything in the house, and, strange to say, once shown a circuit, no matter how complicated, he could reproduce it by memory, and has several of his original drawings now that can't be improved on for detail. Five weeks before Robert passed his examination he could not copy even at the rate of five words per minute, but he showed sufficient interest that he begged his father to

ROBERT GARCIA IS WORLD'S YOUNGEST LICENSED RADIO OPERATOR

let him take the test. Seeing that the boy really meant business, he made up his mind to coach him and give him a chance. First he made him copy a buzzer, sending words of two or three letters, then increasing speed 'till the boy acquired a speed of twenty words per minute. Then words of greater length, and finally numerals and words were resorted to 'till he could copy 50 or 100 words in succession. In the meantime he would explain to the youngster the theory of both transmitting and receiving sets, using the technical terms and paralleling them with a kindergarten explanation so that the little mind could readily understand. That done, he gave the boy a copy of the regulations regarding the transmission of signals, etc., and laid out a certain amount to memorize so that he would understand the meaning and would be capable of writing it word for word whenever called upon to do it in the future. This he accomplished beyond the father's wildest expectations. Then came the big surprise. He had but five weeks in which to prepare for his examination. When he took the test everyone that saw him smiled and felt that he was there merely to please his father's vanity. Several lads, many years his senior, fell by the wayside, and several men tried in vain to pass the test. He just smiled all through the three solid hours of his examination and if anyone said anything to him he would answer with a broad smile and wink, as if to say "watch me fool them," and he, only a child of seven years, did what very few ever accomplished—PASSED WIT 92 PER CENT.

Since passing the examination two manufacturers have honored him with parts for the set he is going to install. He has filed an application for a station license and is going to put it up himself. He has declined an offer to install the set and begs his father to let him do it all alone.

TWO A. P. Tubes for same results over 500 miles.

THREE A. P. Tubes for same results over 800 miles.

All replies should be addressed to the Pacific Radio Supplies Company, 638 Mission St., San Francisco, Cal.

6XW—PRESIDIO OF SAN FRANCISCO

Concerts: Wednesday evening from 8 to 9 p. m. Sunday evening from 8 to 9:30 p. m. Wave Length: 390 meters.

Operated by: Students of Signal Corps Radio School. Thirty minutes is devoted to the answering of radio queries on Sunday nights by Sgt. Tavers, in charge of the radio telephone station at the Presidio.

6XG—FAIRMONT HOTEL, SAN FRANCISCO

Concerts: Monday, Thursday and Saturday evenings from 7:45 to 9 p. m. In these concerts is included the usual press and baseball schedule, as well as weather reports and stock quotations. Afternoon concerts are held daily, except Sunday, from 4:30 to 5:30 p. m. Press, weather reports and stock quotations are also sent on the latter schedule.

Wave Length: 350 meters.

Operated by: Léo J. Meyberg Co., 428 Market St., San Francisco.

6XAE—RADIO TELEPHONE SHOP

Concerts: Tuesday and Friday evenings, 8 to 9 p. m.

Wave Length: 425 meters.

Operated by: Radio Telephone Shop, 175 Steuart St., San Francisco.

6XAC—COLIN B. KENNEDY CO.

Concerts: Monday and Thursday evenings, 8 to 9 p. m.

Wave Length: 430 meters.

Location: Los Altos, Cal. (about 40 miles south of San Francisco).

Operated by: Colin B. Kennedy Co., Rialto Bldg., San Francisco.

6XD—WESTERN RADIO ELECTRIC CO. LOS ANGELES, CAL.

Concerts: Tuesday and Friday evenings, 8 to 9 p. m.

Wave Length: 325 meters.

Location: Los Angeles, Cal.

RADIO DEALERS AND MANUFACTURERS OF SAN FRANCISCO TO ORGANIZE

A meeting of the radio dealers and manufacturers of San Francisco and the bay cities was held at the Engineers' Club on August 19th. A stag dinner, lectures by well known local radio men and many vitally important discussions were the features of the evening. Further details of the organization and its purposes will appear in the next issue of this magazine.

NORTHWEST RADIO MANUFACTURING COMPANY ISSUES CATALOG

A well illustrated catalog, printed on an excellent grade of paper, and describing in detail the apparatus manufactured by the Northwestern Radio Manufacturing Company, of Portland, Oregon, has recently been brought to our attention.

The catalog contains bulletins Nos. 1 to 8 that deal with the various products of the northern concern.

NEW RADIO TELEPHONE SCHEDULES

RADIO TELEPHONE CONCERT AND NEWS SCHEDULES.

PACIFIC COAST RADIO STATIONS.

California Theatre (DeForest Radiophone) operated by Pacific Radio Supplies Company of San Francisco.

Concerts: Daily, except Sunday, 4 p. m. to 4:30 p. m. and 7:15 p. m. to 7:45 p. m., 9 p. m. to 9:45 p. m. Sunday concerts 11 a. m. to noon.

Press on CW: Daily, except Sunday, 7:45 p. m. to 8 p. m.

Wave length: Tune sharp on 1,250 meters. Power 1-2 K. W. Range 1000 miles.

Nature of Press: Coast League Baseball Scores, National and International News Items.

The Pacific Radio Supplies Company will offer the following prizes to those who report, with correctness, the results of the schedule as stated herewith:

PRIZES OFFERED: One A.P. tube for complete list of records played at any concert, heard over 200 miles, said list to be mailed within 24 hours after the close of the schedule.

FOREWORD

(It affords us a great deal of satisfaction to reproduce verbatim a copy of a letter that Mr. Ira J. Adams—of The Radio Corporation of America—was so polite as to write me, in answer to my query—that is also reproduced herewith.)

The reason for the prominent publication of these communications is that both the editor and I overload our waste paper baskets daily—queries all of: "Where may vacuum tubes be repaired?" And: "If they may not be repaired, WHY not?" And so forth—ad infinitum!

A politely explicit letter from the Eastern Vacuum Tube Laboratories,—whose advertisement to do repair work on tubes was carried in our pages in a previous number—has reached me to the effect that their efforts along these lines had been put a stop to, said efforts being considered an infringement of patent rights—Q. E. D. by the communication from Mr. Adams!

The entire position is now made clear, we think, and I should like to thank our correspondent for the consciousness of his misgiving.

Mr. Adams is, I believe, the Legal Luminary of The Radio Corporation, and hence pre-eminently in a position to set these matters right!

MR. MOTT'S LETTER TO MR. BUCHER

TWIN SUNSHINE
Avalon, Catalina Island
California

June 26th, '21.

Very Kind Friend Bucher:

It has been suggested to me—NOT by my editor, however!—that I take up the matter in PRN of the repairing of vacuum tubes.

In order to see how affairs stood I sent three of your UV202's to the firm whose letter I enclose, and would ask you to be so good as to return.

The pertinent question that is uppermost in my mind is: HOW can a Company or Corporation order the discontinuance of REPAIRS to their manufacture—when said repairs involve no re-selling under another title, or in any way threaten the original patent?

To the man-in-the-street the conditions—as stated in Hardy's letter—savor much of a gentle spirit of "hold up" on the part of the Controlling Manufacturers—in which it would appear that they say: "NO! Our tubes may not be repaired! NEW ones must be procured from us!"

Kindly assimilate the fact that I am NOT criticizing—nor would I venture so far as to suggest the way in which the GE and the Radio Corp should carry on their business—BUT do you not think that were tubes' repair possible—even, shall we say, that the GE company perform such repairs on their own tubes, at a just cost—that the sale would be enhanced, and for the reason that so many amateurs are afraid of going into CW—as matters now stand—their fear consisting in the fact that tubes may not be repaired, and the average amateur pocket-book cannot stand the drain of repurchases, ad libitum! In other words: were the GE to repair their tubes, the original sales would—far from being diminished—be enhanced, as a vast number of amateurs, feeling secure in their ability to have repairs made, would enter the CW field at once!

I am willing to wager—tho' not a "Gambler's Ma-an"—that such a scheme would be effective in BOOSTING sales!

Let me put it in another way: Supposing that the Wisconsin Motor people—three of whose powerful engines I use in slow and fast craft—should say: "Very sorry, Mr. M., but you may not go to a shipyard or ma-

chine shop to have our engines repaired! You must buy a new one!" The case is directly similar to that of the tubes, as the GE is—to all intents and purposes—the only firm on the market, and controls all patents in sight!

Hence, ere I dash blithely into print with an article that might produce an entirely erroneous impression—and which, under NO circumstances would I do!—would YOU, my friend, be so charitable as to sit ye down and let me have the Official Viewpoint—from Ye Powers that Be in the Radio Corp? I—thank—you!!

Hope that you liked the way the article looked in PRN? Questions pour in! I refer 'em all to One EEB!!!

Cheerily and gratefully yours,
(Signed) LAWRENCE MOTT.

THE RADIO CORP. ANSWERS AS FOLLOWS:

RADIO CORPORATION OF AMERICA
233 Broadway,
New York.

July 11, 1921.

Mr. Lawrence Mott,
Twin Sunshine,
Avalon, Catalina Island,
California.
Dear Sir:

I have your letter of June 26th addressed to Mr. Bucher.

You commence with an erroneous assumption. Under our patent laws a company cannot, and, so far as I know, none attempt to, "order the discontinuance of repairs" when such do not "in any way threaten the original patent."

The reason you can repair your Wisconsin engine, to which you refer, is because you do not "threaten" the patents on the same. You add new bearings, piston rings, gaskets, etc., that are not part of the patent combination on the engine.

Now, in respect to vacuum tubes, the renewal of filaments certainly does "threaten" our patents. The patents to Fleming and DeForest, without mentioning many other patents that we control, claim the filaments as one of the elements of the tubes. The filament is part of the patented combination. Furthermore, the Tungsten filament itself is covered by many patents. The methods of sealing the filaments are patented. Furthermore, to renew the filaments is not a "repair." It is a RECONSTRUCTION under our patent laws, and it is not permissible. The decisions on this point are so in accord that there is no doubt at all in regard to the legal situation.

Laymen are not impressed by the expounding of patent law, so let us examine this matter from a common sense viewpoint. We have spent an enormous amount of money to develop and acquire rights under inventions and will continue to do so. In return we get 17 years' lawful monopoly under our patents on our discoveries and inventions. Often, as was the case with vacuum tubes, a substantial part of the life of the patent expires before there is any market for the patented thing. Therefore, we should not be begrudged the benefits to which we are lawfully entitled.

If we were to refrain from prosecuting infringements due to so-called "repairs," our patents on vacuum tubes would be practically valueless to us. After a few years of supplying the demand there would be enough tubes on the market to take care of the major portion of the needs, and the so-called "repair men" would reconstruct these tubes then on the market and leave us the minor part of the business of supplying new tubes. We could not compete with a little "fly-by-night" "repair man" in renewing the filaments. He would be entirely free of the patent and development expense and his overhead would be a trifle. These "repair men" would not spend any money for research and development and we would not if the profits were to go to them.

Our patent laws benefit the public. They exist for this reason. If the laws were to be made so we could not stop the so-called "repair" of tubes the public might obtain cheaper tubes for a while, but they would not get the super-vacuum tube that is surely coming in the future, if we are given just protection under the present patent laws to assure a reasonable return for the immense amount of money that we are spending and will spend for future development.

You may be correct in your statement that the public and the Radio Corporation would benefit by our renewing the filaments in our tubes. On the other hand there might not be any such benefit. I am inclined to think there would not, or such program would already be under way. However, I am not familiar with manufacturing conditions and I will refer this to the proper department for consideration.

I am glad of this opportunity to give you our viewpoint as the course we are taking is entirely justified under patent laws, and, I believe, also by sound reasoning, and if I have been able to convince you I will have rendered a service to the public. If I have not convinced you I will be glad to discuss the matter further.

Very truly yours,
(Signed) IRA J. ADAMS.

Feature Articles in Next Month's Issue

LATTICED
WIRELESS TOWERS
By Allan K. Thompson.

"HUMBUG"
By Volney G. Mathison

THE CONSTRUCTION OF AN
EFFICIENT C. W. SET
By O. Schuwendt.

INTERESTING DETAILS ON
THE C. W. CLUB OF
CALIFORNIA
By Lawrence Mott,
Associate Editor.

AND MANY OTHERS

THE MAGNETIC AMPLIFIER

A Treatise on its Theory, Design, and Construction

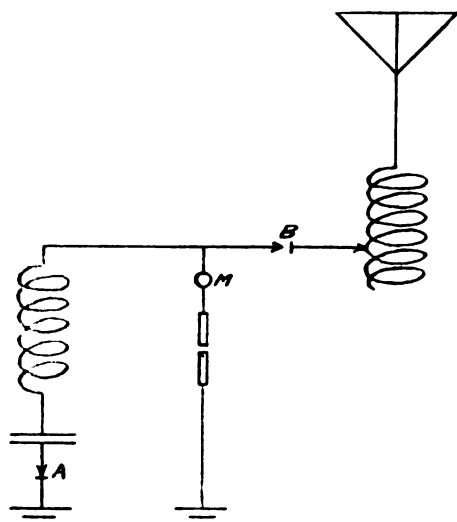
By Jennings B. Dow

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PART V.

THE KEYPORT EXPERIMENTS

THRU the courtesy of Commander H. G. Shoner, U. S. N., District Radio Material Officer, Thirteenth Naval District, and Lieutenant Commander Frank Luckel, U. S. N., District Communication Superintendent, Thirteenth Naval District, the United States Naval Radio Station at Keyport, Washington, was made available for experimental work by the author on May 24, 25 and 26, 1920. Only a 30 K. W. arc was available at the time, for the 60 K. W. arc had not as yet been installed. This limited the tests to the control of but half of the de-



signed power, and the results were affected accordingly. However, as the reader will find, very encouraging results were obtained and the adaptability of the iron relay to the control of the output of a high-power arc was proved beyond a doubt.

Fig. 15 shows the circuit in use at Keyport.

"A" is a key in the ground lead of the dummy antenna circuit. This key is normally closed.

"B" is a key in the lead from the posi-

tive electrode to the loading inductance. This key is normally open. "B" breaks in running water and "A" in oil.

The amplifier was first inserted in the circuit at "n" with eight turns in the radio-frequency winding. "B" was held closed and "A" open, and it was found impossible to start the arc, regardless of the saturation of the iron. The current thru the control winding was limited to 1.3 ampere by the applied voltage of 60, which was obtained from storage batteries. It was deemed inadvisable to use the 110 volts D. C. supply from the station's power plant in these experiments because of a possible danger from unforeseen inductive effects in the amplifier.

The radio-frequency winding of the amplifier was next tapped off so as to include only one turn in the arc circuit. The arc could be maintained without difficulty. Following data was obtained:

Control Current	Antenna Current
0	33
1.3	44

Two turns of the radio-frequency winding were next used. Following data was obtained:

Control Current	Antenna Current
0	33
1.3	47

With three turns of radio-frequency winding in use, the following data was obtained:

Control Current	Antenna Current
0	31
1.3	52

At this point the choking effect of the iron was plainly evident, for some difficulty was experienced in maintaining the arc. Unaccounted for changes in the period of oscillation of the circuit were caused by this device. With only one turn of inductance in use, the wave length was changed from 5400 meters to 5660 meters and with either one, two or three turns in use a powerful harmonic existed on 5400 meters. This harmonic was apparently unaffected by the inductance of the device.

THE END.

THE ANSWER TO THE BALLOON MYSTERY



"Brownie, the Balloon Man"

IF Mr. H. C. Brown (6CH) will be so good as to call on the editor of this magazine, he will be only too glad to show him the many letters that have been received of late in answer to the big balloon mystery and station 6CH. However, it will not be possible to print the answers received, with but a few exceptions, as most of the answers deal at length with "hot air," "wind," "smoke," etc., etc.

Fellow readers of the PRN, we are ashamed of you for sending us such answers to a really sensible question. Why should "Brownie" and the balloon both be full of "hot air" or "wind"?

After all the time and money that we have spent on this contest we feel that both "Brownie" and ye editor have received a raw deal. We would gladly distribute the five one-dollar bills among the five most sensible answers received to the big question, but we can't do this because the answers are all incorrect. Some of our readers compared 6CH and the balloon to the extent that "they both rise to the ether," "both work in the air," "travel through space forever," "both fly high," and oodles of other modest quotations.

(Continued on Page 76)

CORRESPONDENCE FROM OUR READERS

San Francisco, Cal., August 3rd, 1921.

Editor of "Pacific Radio News,"

151 Minna Street,
San Francisco, Calif.

My Dear Editor:

A long time ago, when PRN was a mere baby, I received a copy of the FIRST NUMBER, which asked me to subscribe for a year and help the Pacific Coast to have a magazine devoted to the highest ideals of Radio Amateurs. I read the number from cover to cover and immediately sent in my subscription and a letter congratulating the management for their venture into such a needed periodical, and all through the three years of its publication you have stood for the same standard of "THE BEST IN RADIO" for the "BEST IN RADIO," and permit me to say that it is my belief that PRN has helped to do more for the Pacific Amateur than all the other magazines combined, because it is OF US AND FOR US. Because of this I am going to infringe a little while on your good nature and ask you to help solve a timely nuisance.

We are in the age of Radio telephones now and with such excellent stations as the Fairmont, Presidio, California Theater, and numerous others giving concerts every evening between 8 and 9:30 why is it that a few inconsiderate amateurs insist on making life miserable for those of us who enjoy a few moments of the concerts so ably rendered? It does seem to me that 6— could wait until after 9:30 to ask 9PDQ if his spark was O.K. and augment the agony by calling for a straight 15 minutes and signing off about 99 times, as though we didn't know who the nut was that was causing the disturbance. There is nothing I so fervently despise as a chronic complainer, but this is my night to crab and I am not alone, either, when I crab about the way some fellows of the cigar box variety are butting in on the concerts. These boys who are kind enough to give their time for the few minutes of pleasure they afford for the thousands of listeners should be appreciated and encouraged to the small extent of at least being afforded the freedom of the ether without having our loud speakers knocked off the shelf by some bush-whacking half Kw, who is so selfish as to believe that he is the only one to be considered. I do not believe it is the fellows who are doing the best work that cause the trouble, but, at any rate, something should be done for the good of all in this one respect. I am aware of the fact that there is no law to curb this growing evil, but certainly a fellow who has intelligence enough to delve into radio ought to have decency enough to "pipe down" and respect the right of the majority of us, who enjoy the fruits of our labor. ALL WE ASK IS TO GIVE US A CHANCE.

With best wishes to yourself and PRN,

Very sincerely,

(Signed) H. C. MACQUARRIE.)

ERRATA

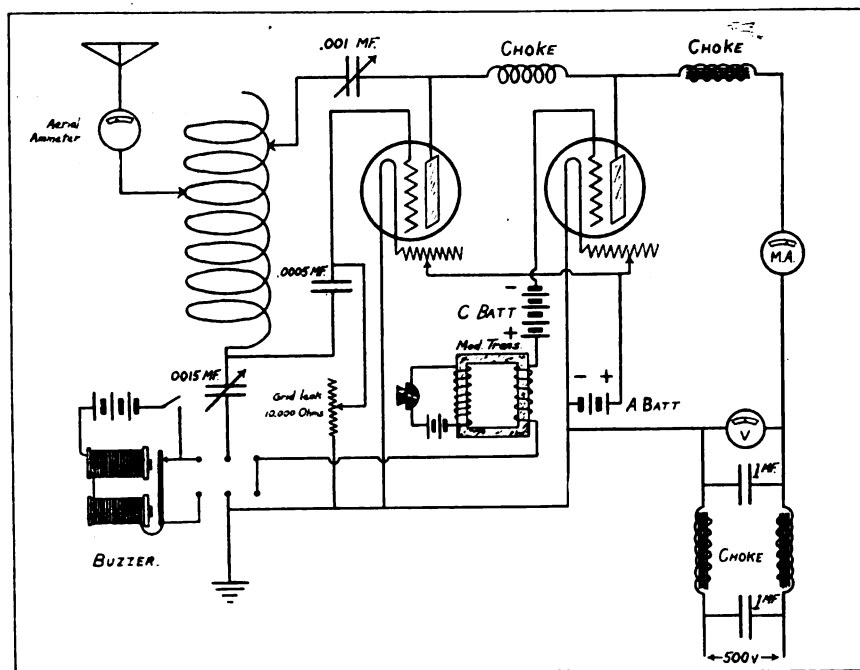
On Page 34 of the August issue there appeared an article entitled "New Apparatus Developed." This article should have been run under the head of Northwest Briefs in the Squawk McGuff column, for which it was originally intended.

THE PROGRESSIVE C. W. CLUB OF CALIFORNIA

CONDUCTED BY LAWRENCE MOTT, ASSOCIATE EDITOR

Wiring Diagram of the Fairmont (6XG) Radio Telephone

Herewith is the wiring diagram of the Fairmont Radio Telephone Station in San Francisco. This phone set has just been reported heard 1600 miles west of San Francisco by the radio operator on the S. S. "West Hixon." The various condenser capacities are clearly shown on the diagram. The inductance values and sizes of meters necessary to duplicate the 6XG transmitter were given in our July number.



REVISED C. W. SCHEDULE

Time (P. M.)	Station	Wave length	Name and Address.
9:00	6XAD	240 & 375	L. Mott, Avalon, Cal.
9:05	6PI	200	B. McGlashan, 2333 W. 21st St., Los Angeles.
9:10	6EN	200	H. Duval, 4965 Wadsworth, Los Angeles.
9:15	6WU	200	C. Richardson, Los Angeles.
9:20	6JE	200	C. E. Blalack, Los Angeles.
9:25	6MK	200	L. B. Benjamin, Los Angeles.
9:30	6ALE	200	W. W. Lindsay, Los Angeles.
9:35	6KA	200	F. E. Nikirk, Los Angeles.
9:40	6HU	200	H. G. Beck, Wilmington, Cal.
9:45	6ADU	200	R. P. McKenzie, Los Angeles, Cal.
9:50	6EF	200	C. G. Widing, Los Angeles, Cal.
9:55	6IT	200	C. E. Rich, Glendale, Cal.
10:00	6CU	200	C. F. Flstead, Los Angeles, Cal.
10:05	6XN	375	A. A. Kluge, Los Angeles, Cal.
10:10	6XD	375	Western Radio, Los Angeles, Cal.
10:15	6AQA	200	G. S. Tichenor, Los Angeles, Cal.
10:20	6KP	200	O. S. Garretson, Eagle Rock City, Cal.
10:25	6BA	200	H. Newman, Wesrad, Los Angeles.
10:30	6HK	200	F. Crowell Jr., Los Angeles, Cal.
10:35	6ZE	375	D. B. McGown, San Francisco.
10:40	7XF	375	Northwestern Radio Mfg. Co., Portland, Ore.
10:45	6ZAD	375	J. J. Mahler, Napa, Cal.
10:50	6ZX	375	J. V. Wise, Fresno, Cal.
10:55	6ZA	375	Louis Falconi, Roswell, New Mexico.
11:00	6KH	200	C. Maass, San Francisco.

IMPORTANT ANNOUNCEMENT

The above schedule will only remain in effect for a limited time. The large number of new applications received for the C.W. Club makes it necessary for Mr. Mott to split up the working nights of C.W. stations in order that the last calling schedule will be no later than 11 p. m. Under the provisions of the new schedule each station will be allotted a ten-minute period for calling and testing every other night instead of a five-minute period every night, as is the present custom. The new schedule will be mailed to all members at an early date, stating the date on which it will become effective.

THE RADIO TELEPHONE REPORTER

AN EASTERN radio corporation recently performed one of the most unique and spectacular news services of modern times. Located at the Delaware and Lackawanna Railroad terminal, Hoboken, N. J., was a powerful radio telephone transmitter and receiver utilizing the big steel tower formerly employed at this station in wireless train dispatching. From this central point was broadcasted every important incident round by round of the big Dempsey-Carpentier fight.

More than 300,000 ear witnesses heard the fateful knockout count while located many miles away. In fact, listening-in stations all over the country caught the words and in turn relayed the news farther on to more remote points, so that the event was heard throughout the United States from the Atlantic to the Pacific coast in the same unique manner. In addition to the amateurs, hundreds of vessels, near and far from New York harbor, had also "tuned in," and passengers and crew alike heard not meaningless telegraphic signals, but the actual voice of the radiophone reporter announcing in the same manner as an eye witness would the essential features of what was going on in the arena.

This scientific feat, which marks a new era for radio telephony, was made possible by the combined efforts of the General Electric Company and the Radio Corporation of America. The first organization, by furnishing the necessary apparatus, and the second by installing and placing the set in operation and performing the multitude of details which this feat involved to make it a success.

The feat was primarily devised to help the Committee for Devastated France as well as our own Navy League. Wireless amateurs within a radius of 200 miles were asked to help by offering their services in erecting suitable receiving equipment at local theaters, halls, sporting clubs, auditoriums, Elk, Masonic and K. C. clubhouses and

(Continued on Page 68)



WITH THE RADIO INSPECTOR

This department is conducted by the Radio Inspector of the Sixth District. Questions are answered free of charge. Your name will not be published. Initial your letters only.

Send Your Questions to: Radio Inspector's Dept. "Pacific Radio News"

DEPARTMENT OF COMMERCE

Navigation Service
Office of Radio Inspector
Custom House
San Francisco, Cal.

August 1, 1921

The Editor
Pacific Radio News,
San Francisco, Cal.
Dear Sir:

One of the first circular letters issued by me to the amateurs of the 8th Radio District, in 1913, contained the following admonition: "Remember that the law limits your wave length to 200 meters.

"Always listen in carefully, with your receiver well adjusted, before using your transmitter.

"Do not send if it seems probable that your transmission will interfere with the correspondence being conducted by other operators.

"Cease sending immediately when requested to do so by Commercial, Government or other stations having important business to transact.

"Never use your transmitter during the period allotted for transmitting time and weather reports by broadcasting stations. This data is regarded as essential for the public at large and careless interference with the reception of the same will jeopardize the continuance of your license, whether commercial or amateur.

"Endeavor to exercise the same degree of courtesy in the conduct of your radio correspondence that you would use in your personal intercourse with your friends and associates. An observance of this rule will materially aid both you and they in obtaining the optimum results from the operation of your stations."

Experience through the intervening years seems to have demonstrated the wisdom of that advice, hence those who have the true interest in the welfare of amateur radio at heart, will do well to adhere to the same strictly.

Of the faults common to the average amateur operator's, two are the most grievable—the use of unnecessary power and the use of superfluous and senseless chatter through the ether circuit. It is quite usual in listening in during the evening to hear your friend across the street, using full power, sending: "How is my spark?—How do you get me now? and again—I have just chased a fly off my condenser, does it make any difference in my tone? Nuf Sed."

The inspection service of the California district is proud of the amateur organizations in its territory, and particularly of the San Francisco Radio Club, Inc., the Bay Counties Club and the Southern California Radio Association, which is a potent factor in the co-ordination of amateur radio affairs within its sphere of influence and in the enforcement of the radio laws and regulations. In so far as they apply to the government of amateur operation. The spirit of co-operation and progressiveness manifested by the members of these clubs may serve well as an example for other kindred organizations. The members of the Sunset Radio Club have also perfected an excellent organization which, while smaller than some of the others, is equally efficient.

All applicants for amateur radio licenses are advised to join their local radio club, and once admitted to take an active interest in its affairs. The tendency is to "Let George do it," and to that spirit is due the failure of many new organizations, which actually contain splendid material for a high grade club.

(Signed) J. F. DILLON,
U. S. Radio Inspector.

Questions Answered BY THE Radio Inspector

Mr. R. M., Berkeley, Cal., writes: "I have moved my station from Los Gatos to Berkeley, Cal., and would like to know if the Radio Inspector of this district should be notified of the change."

Ans.: Yes. It is absolutely unlawful to operate unless the station license is returned, and the address changed thereon.

Q.—Is it against the law to transmit while a radio concert is in progress, or is this only a "friendly agreement" among all concerned? What bearing has this on concerts sent from Government stations? D. F., S. F., Cal.

Ans.: Yes, if any interference is caused. Refers to all stations.

Q.—Under what conditions can I have my call letters changed? At present I have a three-letter call. Can I have it changed to a shorter call of two letters? S. J., Berkeley, Cal.

Ans.: No two-letter calls available, and it will be impossible to make such a change.

Q.—Does the Radio Inspector tune amateur stations the same as he tunes ship stations and can I operate my station lawfully by making a rough guess at my wave length, comparing it with waves used by amateurs in my district? L. C., Fruitvale, Cal.

Ans.: No. It is up to the individual owner to tune the station himself, and he will be responsible for the same. It is not a function of the Radio Inspector's office to tune stations. The wave length adjustments are only checked, in order to ascertain their correctness and compliance with the law.

A certain local station "hogs" the air considerably, and is on the job practically all the time. He makes a considerable disturbance on account of the excessive power he uses, and generally makes it almost impossible for other local stations to work when he is on. Have the other stations any right to complain? K.T. SF, Calif.

Ans.: Yes. It is the purpose of the Department to allow all stations the same privileges, and this station is clearly in the wrong, first for using excessive power, and second for causing unnecessary interference. The offender's licenses may be suspended or cancelled, if authentic information, including dates, and time, is sent to the Inspector's office, and if it is found that the accused station is at fault.

Q.—Are amateur license examinations held daily in San Francisco? B., S. F., Cal.

Ans.: Amateur license examinations are held at 9 a. m. sharp, on Mondays, Wednes-

days and Fridays only. Commercial examinations are held on Tuesdays and Thursdays at the same time. These are all held at 215 Custom House, in San Francisco, Calif.

Q.—Will my service with the U. S. Coast Guard entitle me to the 20 per cent credit in a commercial examination? C. P., Seattle, Wash.

Ans.: Provided you have had three months' service, or more, actually operating radio apparatus, you will be entitled to 20 per cent experience credit. This must be supported by letters, discharge papers, or other evidence of service.

Q.—Are radio traffic officers or "air policemen" officially recognized by the Department of Commerce or only by radio clubs who appoint them? Must they be commercially licensed? F. P., Pasadena, Cal.

Ans.: They need not be commercially licensed. The appointment is solely up to the individual club appointing them; however, as they are assisting in the enforcement of the radio laws, and aiding in the elimination of unnecessary interference, they are thus recognized by the Department of Commerce, over other stations.

Q.—I reside at Santa Barbara. To whom do I apply for a license in this vicinity? E. R.

Ans.: Apply to Radio Inspector, 215 Custom House, San Francisco, Calif., and the necessary forms will be sent you.

Q.—The law says that only one-half KW shall be used when a station is within five miles of a Government station. Will it be permissible to use two 250-watt tubes, equal to a half KW, in a CW set, or will this be unlawful, due to the fact that CW carries so much further than a spark? C. A., Oakland, Cal.

Ans.: The law states: "One half kilowatt transformer input," therefore, as it would require considerable in excess of 500 watts input (on the plates on the tubes) it would be unlawful.

Q.—Are there any vacancies as radio clerk (male) in the Radio Service of the Department of Commerce? When are examinations held and where? T. S., San Francisco.

Ans.: Apply to Civil Service Secretary, Postoffice, San Francisco, who can give all details of the examinations.

CHANGE OF STATION ADDRESS

6AFX has moved his station from 32 Walnut Ave., Los Gatos, Cal., to 1820 Carleton Street, Berkeley, Cal.



A STILLY MYSTERY

BY VOLNEY G. MATHISON
Author of the Samuel Jones Series



WHEN I escaped by the skin of my teeth from the gang of yellin', ravin' six-shooter artists at Unga I thought I was through with Alaska forever. But here I was mistaken. The ornery crowd on the cutter that rescued me dumped me ashore at Kodiak; and there I would've stayed an' starved to death if it hadn't been for Iceberg Olsen, the local agent for the Alaska Codfish Company.

"Ay tank you better go back to Unga," advises Iceberg, when I'd told him how the gun-fightin' codfish snallers shot up the wireless shack an' chased me to sea in a dory in the middle of the night.

"Them didn't mean no harm; them was yust tryin' to initialate you. Ven them is finished you are vun of der boonch."

"Yes, one of the bunch up in the cemetery, you mean," I answers.

"Vell, look at Hell-Fire, th' vireless feller vat built das Unga an' Pirate Cove stations—he bane in Alaska five year, an' he swears now he can't live novheres else."

"Yes, but he's a lunatic," I objects.

"Das all right—ven you ha' bane hyar five year you'll be th' same vay," argues Iceberg.

So at last I gives in, and Iceberg takes me back to the westward in a company gas-boat. With the help of the Brainless Swede, the company's Unga agent, he patches up a peace treaty between me an' the Mexican who'd tried to carve me up because his wife smiled at me; an' then I goes to work pluggin' up the bullet-holes in the walls of the little wireless shack, which hangs by its teeth on a granite ledge half way down the face of a rocky bluff overlookin' the bay. By the time I'd plugged the forty-first an' final hole, the boomin' of the breakers down among the rocks an' the salt spray flyin' up over the shack had got me to feelin' quite at home again. Besides, I had a good many visitors congratulatin' me on my return an' bringin' messages to go out; for with the exception of a mail-boat two or three times a year, K-V-I is the only link between Unga Island and the outside world.

That evenin' I cranks up my old one-lung gasoline mill to shoot my string to N-P-R, but when I shoves on the key she falls to spark. Lookin' over the old junk-pile transmitter out in the power room, I couldn't see nothin' wrong, at first—an' then I makes an amazin' discovery. The big copper spiral primary of the oscillation transformer mounted on the front of the panel had disappeared! I rubs my eyes an' looks again, but there was no gettin' around it—the thing was gone.

Next day I does some inquirin' around town, but, failin' to dig up any traces of the strayed helix, I finally decides to make a trip over to K-O-X-N an' see if Hell-Fire could give me something to make a new one with. Borrowin' a power dory, I makes the twenty-mile trip up the Straits of Nagai and around Popoff Island to Pirate Cove. Makin' my boat fast alongside the codfish wharf, I breezes up to the station, which consists of two buildings—an engine house an' a operatin' shack.

As I comes up, I observe a big flywheel an' a sooty cylinder-head lyin' out in front of the engine house; an' from the open door is

emenatin' a blaze of cuss-words that would burn the aluminum paint off'n a steam radiator. Lookin' inside, cautious-like, I sees sledge hammers an' cogwheels an' piston rods scattered all over the place; an' lyin' on his back under the remains of the engine, with his legs wrapped around the other flywheel is Hell-Fire tellin' the world what he thought about diesel engines an' the scoundrel that invented 'em. His face was all smeared up with grease an' graphite, an' he was clutchin' a big monkey-wrench in one fist an' a bottle of hooch in the other.

Seein' me, he crawls out from under the wreck an' gets up.

"Nice day," he says, spittin' out a mouthful of soot an' kerosene an' takin' a swig on the bottle, "Have a drink."

"No, thanks," I replies, observin' the embellishment of grease an' grime remainin' on the bottle neck; "I'm lookin' for somethin' to make a helix out of—somebody's stole the primary of my oscillation transformer."

"Why, I took that!" says Hell-Fire, frownin'. "Th' way ya left that night, I didn't think you'd ever come back. I took the spiral tubin' to make a new still out of—my old one's plumb worn out."

"Still!" I exclaims.

"Do I look like a white-robed angel of prohibition?" growls Hell-Fire, wipin' his face on a old grimy engine rag. "C'me an' have a peek at her—it's time to give her a new charge of brew, anyway."

He leads me down the beach to a little boulders an' cracked lava rocks. Followin' boulders an' ovracked lava rocks. Followin' him inside, I sees my copper helix in a salmon barrel full of cold water, the upper end soldered into a five-gallon coal oil can sittin' on a camp stove, an' the other end protrudin' out through the side of the barrel an' curvin' gracefully down into a demijohn. She had steam up an' seemed to be goin' full blast.

"I'll give ya some solid bar to make a new primary with," says Hell-Fire, shiftin' the full demijohn from the copper tube an' settin' up a empty one. "It ain't no use fer you to take the tubin' back—somebody else'll swipe it again fer th' same thing. Wireless sets made fer Alaska all ought'a have solid copper helices."

"An' a conspicuous sign on 'em so statin'," I adds. "But, say, while I think of it, I'm goin' to put you next to somethin'. When the cutter dumped me off at Kodiak there was some queer guys aboard, an' I heard 'em talkin' about plans bein' under way to clean out all the hooch-makers around the Alaska peninsula with a fine-tooth comb shortly. Better look out with this rig."

"Humph! They been tryin' to spot the dynamite fact'ries 'round these islands fer three years, without findin' enough hooch to intoxicate a grasshopper," sniffs Hell-Fire. "Anyway, I got a contract to deliver sixty gallons of triple-strength white lightnin' to Unga fer th' Fourth a July—an' in Alaska ya hafta keep yer word or git shot."

We return to the engine house, an' Hell-Fire digs up a couple lengths of soft copper bar. Then he picks up his wrench an' his

hooch an' crawls back under his engine; an' I gets into my dory an' sets out on the return trip down the Straits.

Two hours later, as I was doublin' Cross Island, where the village of Unga comes to view, nestlin' at the foot of a high, snow-ridged mountain, I espies a low gray top-mast schooner beatin' swiftly out of the bay. She looks like a fur pirate or a seal poacher, but when I makes the landin' at Unga I finds out different.

"It was the mail schooner," says old Dopey Driffeld, combination judge, postmaster, an' everythin' else, who was buzzin' excited like around a pile of packages an' mail sacks. "And, say by Jove, you ought'a seen the female passenger what come ashore off here—a dream, a livin' angel in petticoats!"

"No angel never come off'n that piratical-lookin' fore-an'-after," I tells him. "An' you ain't competent to judge an angel anyway—every codfish snaller in the Shumagin Islands knows you're nuts over everythin' that walks with a skirt on it, black or white."

"Wait till ya see her," returns Dopey, lookin' offended. "She's a young authoress makin' a trip to collect up story-writin' materials. She's gone up to arrange fer lodgin' with Hog-Tooth Wilson's widow. She's a bird—a reg'lar little dove. Why, 'longside her physic, or whatever ya call it, th' best lookin' female in this village's got a shape like a dead codfish!"

"Well, that's what they have, anyway," I retorts. Leavin' Dopey to his mail bags an' several suitcases, which he says belongs to the girl, I starts up to my shack. On the way I notices a tall, nosey-lookin' guy with a grip goin' into Soapy Komedal's Bedbug Barracks—the town's only hangout for strangers.

"Who is that guy?" I inquires of Hammar the Head-Cracker, who was standin' alongside the company cook house, with a uneasy look on his face, watchin' the stranger.

"Nobody knows," he answers, fingerin' his Krupp junior uncertain-like. "Tin-Pan Smith asked him, but he told Tin-Pan it wa'n't none of his damn business. I feel like takin' a shot at him on general principles."

"Better wait," I advises him. "I heard Cyanide Simpson say he was expectin' a guy from Treadwell to look over a new quartz vein in his old mine up the bay. Maybe it's him."

The followin' evenin' I had a new helix all made an' was just paintin' a sign on a chunk of cardboard, "Solid Copper; Don't Take," to hang on it, when I espies Dopey's angel strollin' on the hill up above the wireless shack.

Now everybody knows that every time I fool with a female I get roped. The last time it was a pretty baby in a Frisco cafeteria, who jipped me out of four thousand bones I'd worked hard for smugglin' pearls, an' then runs off an' marries a gob. But this girl keeps stickin' around on the hill, an' pretty soon I gets to thinkin' maybe she's lonesome. It bothers my conscience so much that at last I goes an' brings her down to the shack—and she was pretty.

She looked young an' slim an' a trifle tired; her hair was brown an' she had eyes to match, soft, warm brown eyes that looked lonesome an' cuddly, like they wanted to make friends but were a little bit afraid. She certainly looked out of place in such a wild an' woolly layout; an' I tells her so.

"I'm on the way to some friends at Dutch Harbor," she answers. "I really never dreamed of stopping here, but there was a big tall gentleman on the schooner who told me so much about the moonshiners and sourdoughs that live among the Shumagin Islands that I just had to stop. Why, I'd just give the world to see a real honest-to-goodness Alaska moonshiner and his hiding place."

"Guess I'll have to take you over to visit Hell-Fire," I laughs, and then I tells her about the Pirate Cove brass-pounder and his joint down in the rocks.

"I'd just love to see him!" she exclaims, plumb delighted. "If you really will take me over there some time, I—I don't know how I ever could thank you!"

"I'll take you," I promises her. She stays an' watches me clear N-P-R, an' then I takes her home. It was about 10 o'clock when I leaves her with Hog-Tooth Wilson's widow an' stumbles back through the pitchy darkness out to my shack to grab off the arc press that loops the loop every night from Frisco to Tokio. I reaches the shack an' a bunch of choice file stuff goin' from N-P-M to N-P-O. After press, I stays on, listening in. On a real Alaska night signals come in strong at Unga on a single bulb that would come weak in the States on a two-step amplifier—an' this was a real Alaska night, clear and cold, and not a trickle of static. The grasshopper jabber of J-J-C and the heavy flat of N-S-S, the synchronous note of Mexico City and the flute of Nauen—all the high powers of the world were coming soft an' clear on their tunes—and then there was a scratch an' a click and the signals were gone!

The bulb was still burning, the secondary circuit was still oscillating; I feels all the con nections, and nothing was wrong. From eighteen thousand meters I runs the scale down to two thousand; then jumps over to short-wave sparks an' goes on down to six hundred—and not a chirp. The air was dead! Half an hour later I was still there with the cans on, sittin' like a petrified mummy, when click! back comes the signals, soft an' clear as ever.

Next morning I goes up the hill to examine the aerial for a swingin' ground—but there was no possible chance. There wasn't a stay within ten feet of aerial or lead.

Still puzzlin' over the mystery, I makes ready to take Alice Loring for a trip over to Pirate Cove; but just as we were startin' who comes shootin' into the bay in his dory but Hell-Fire himself. His dragged fur cap was hangin' on one side of his head, his corduroys an' mackinaw were full of mud, an' on his grimy face was the glare of a scalp-huntin' savage.

"Revenue cutter raided me two o'clock this mornin'!" he whoops, as he makes the fish wharf. "They landed in their boats an' come straight to the dynamite works an' smashed up everythin'—somebody tipped me off! I was down in the shed gettin' out the Fourth of July order—just got away by the wink of a eyelash!" He starts to spit out a battalion of cuss words, but notices the girl alongside me an' chokes 'em off.

I introduces him to Alice, an' then the Head Cracker comes down on the wharf with a face on him like a funeral an' calls me aside.

"There's a horrible mystery goin' on 'round here," he says, nervous-like. "Late last night I seen somethin' snoopin' down to th' beach round th' back way behind Hoid-Up Harry's shack—a black figger with a black bundle or somethin'. I sung out at it, but there wa'n't no answer, an' before I could shoot th' thing dis'peared. I looked fer tracks this mornin', but th' ground's froze too hard."

"I had a phony experience last night myself," I starts to answer, but the Head-Cracker cuts me off.

"Wait, I didn't tell you it all yet," he says, peevish-like. "That stranger's gone—clean vanished. Should'a shot him yesterday while I had a chance. An' 'nother thing's dis'peared, too—th' cook house ladder. Greasy Bill couldn't get on th' roof this mornin' t' clean th' chimbley, an' we didn't git no breakfast yet—dammit anyway."

"It's blasted mysterious," I agrees. "I don't make head or tail of it—only I've got a feelin' that that tall stranger tipped the cutter some way about Hell-Fire's joint."

"No, you're wrong!" flares up Hell-Fire, who'd come up with the wide-eyed Alice to listen. "I know who done it, all right; it was Yeast-Cake Johnson's gang over on the mainland. Ol' Yeast-Cake warned me he was goin' to fix me if I didn't lay off cuttin' into his Unga trade—an' he's done it."

"That's a dirty outrage!" busts out the Head-Cracker, forgettin' all about the night's mysteries. "We'll get th' gang together an' go'n shoot Yeast-Cake's outfit off'n th' map—underhanded business dealin's like that don't go 'round these islands!"

"That's what I come fer," replies Hell-Fire. "We hafta go in two boats—one gang to Portage Bay to draw Yeast-Cake's crowd down out of their hangout up in Silver Valley, an' the other bunch to go to Balboa Bay an' foot it over th' mountain to the head of Silver Valley an' come down on Yeast-Cake from behind. We gotta save his plant—it's th' only big one left in commission, an' if we lose it we'll hafta celebrate th' Fourth a July with soda water an' peanuts."

"The Head-Cracker hikes off to round up the codfish snallers, but they was mostly out on the fishin' grounds; so the expedition had to be postponed till the next day.

That night, as I was grabbin' off the press, the queer stoppin' of the signals comes on again. The set was entirely dead for about twenty minutes; then all of a sudden she starts perk'n again, same as ever. Next mornin' I hunts all over the blamed rig, looks at the aerial switch an' wirin', but there was absolutely nothin' wrong.

Meanwhile the codfishers an' Hell-Fire went away in two gas-boats on the thirty-mile trip to the mainland, to do battle with Yeast-Cake—an' 'that evenin' they comes back hoppin' mad, without havin' fired a shot.

"Th' cutter cleaned 'em out!" howls Hell-Fire. "Landed a gang of hooch-hunters in Balboa Bay early this mornin', an' they sneaked over th' mountain an' come down on Yeast-Cake's outfit while they was all asleep. They nabbed every one 'cept Prune-Juice Pete, who was doin' sentry duty down on the Portage Bay beach—they're a bunch of dirty sneaks, ambushin' honest people that way!"

"I tell ya' there's a dark an' dang'rous mystery campin' in this town!" glooms the Head-Cracker, lugubriously. "I seen that black thing flittin' 'round again last night."

Everybody was upset over the news of the raid, but Alice Loring was even more put out than all the hooch-gulpin' codfishers.

"Oh, dear, I'm so disappointed!" she exclaims when we tell her about it. "Here I've come all this way to see a real Alaska moonshiner at his work, so I could write a story about him, and now that miserable old revenue cutter has got the only outfit left. I always have the meanest old luck, anyway," and her soft brown eyes looks kind'a teary.

"Yes, it's a rotten shame," I agrees, an' I was sincere, for I was thinkin' of the Fourth of July, "but if you'll just stick around, somebody else'll start a new one before long."

In a day or two things had quieted down a little, but I notices that Hell-Fire, instead of going back to Pirate Cove where he belongs, keeps hangin' around Unga. I soon sees that he's dead stuck on Alice, an' I didn't like it much. I went to visit her pretty often, but Hell-Fire does the same. Pretty soon we wasn't on speakin' terms any more, an' our mutual enmity was growin' like a sore boil. Things drags along this way in the kind of smoky calm that goes before the storm until one day I hears that Hell-Fire is buildin' a new still up in Gumboot Hansen's fish shed for Alice's special benefit.

Right then I sees I gotta step fast in this kind of competition; so I gets busy with a piece of pipe an' an old barrel an' a camp stove an' makes a fake still in the engine room of the wireless shack. Hell-Fire had saved one demijohn of choice hooch from the wreck of his joint at Pirate Cove, which he'd stowed in my shack; an' I takes this an' runs it into a can with a valve in the bottom, so I could give a exhibition with it when the proper time comes. When I had it all fixed I goes to see Alice. Hell-Fire was there the first time I come, but at last I finds her alone.

"I'm gonna trust you with a big secret," I tells her, serious as a cemetery. "Nobody knows it, but I'm the biggest moonshine manufacturer in the Shumagin Islands."

"You are!" she exclaims, her brown eyes wide open. "Honest!"

I takes her out to the shack an' shows her the phony outfit, an' she falls for it like a duck.

"Hell-Fire's an' Yeast-Cake's rigs were tin-can toys 'longside of his apparatus," I tells her; "this whole shack is nothin' but a hooch factory—the engine gas tank an' th' coolin' tank an' the radio apparatus cabl' nets an' everything else around here is chock full of it." While I gives her this spiel, I makes a fire in the camp stove an' runs Hell-Fire's hooch out of the can back into the bottle. She smells of it, an' was tickled to death.

"Oh, you're just wonderful!" she exclaims, givin' me a pretty sweet look. "I just adore you!"

"So do I you," I answers, all of a sudden, comin' up close to her. "You're too young an' good to be driftin' round this wild an' woolly country alone," I tells her; "what's the use of writin' flub for a bunch of bilious old editors that won't buy it anyway—wouldn't you rather be married to a nice big husky moonshiner—" I tries to put my arm around her, but she blushes an' shoves me away with a strength I'd never imagined she had an' beats it.

That night the signals went out again for the third time. Somehow it made me feel gloomy, an' the next mornin' when the Head-Cracker, wearin' a face like a tombstone, tells me he'd seen the mysterious spook again the night before, I feels still gloomier. I tramps around the shack all day sufferin' with what a high-brow ink-slinger would call a presentiment of impending calamity.

(Continued on Page 60)

SHOULD THE SHIP OPERATOR USE HIS OWN APPARATUS?

The following letter is from a commercial operator who has made a detailed study of the situation.

STANDARD OIL COMPANY

(Incorporated in California)

COMPANY CORRESPONDENCE

San Francisco, Cal., July 19, 1921

Editor, "Pacific Radio News,"

151 Minna Street,
San Francisco, Cal.

Dear Sir:

There has from time to time been some discussion among commercial radio operators in regards to the custom of many operators having their own receiving equipment on vessels. After thinking the matter over and studying the question I wish to set forth some views on the subject as follows:

In the first place, it is a money investment that brings no returns. Of course, one might argue that if some operators feel like investing their money in something that brings no return, it is their private affair. In this case, however, it ceases to be a wholly private matter, because it does injury to the man that cannot afford or does not feel like furnishing receiving apparatus of his own.

Second, and more important, it is strictly against the rules of the employing or service companies to use other apparatus than the standard furnished by them. Remember, the service companies are paid to furnish all apparatus and they do so. If the steamship company, which pays cold cash is satisfied with the apparatus furnished by the service company, why in the name of Heaven should not this apparatus be satisfactory to the operator? Is it not a fact that years and years before there was such a thing as audions or amplifiers or regenerative circuits that the radio business was conducted just as satisfactory as it is today? I am ready to state that it was conducted more satisfactorily. So the service company has full right to expect the operators of 1921 to be as capable as they were in 1910 or 1912. It takes no ability to receive with an audion, but it is an art to get business through with a crystal detector. You will not usually learn in any school or from any books how to adjust a crystal to its highest efficiency.

Third, it is unlawful—or so they say—to use the amateur audion for commercial work. If it is unlawful for the service or steamship company to make use of the audion, I gather that it is equally unlawful for the operator to use it. Some operators are so very accommodating that in order to get time signals and a few items of press, they violate the injunctions and counterinjunctions of the courts. After all, you must be looked upon, by different interested parties, as a perfect fool! I have heard officials of some companies classify you as such. And what else would you expect?

Fourth, the apparatus put aboard by the service company, for which the steamship company pays money (always remember that), is the only legal apparatus to be used on the ship. Now, mind this, that should something happen and should your private set fail during such a time, you might kiss your license good-bye forever. Besides, the master could also get in trouble for allowing unstandardized apparatus to be used. And another important point, which I got from an insurance attorney, is that the insurance people would have a good case against the steamship company, in case of accidents. The apparatus placed on the vessel is in the records as the ship's equipment and no operator has the right to remove it or to substitute it for any old thing that he thinks is better. No more right than the master has to throw the lifeboats overboard and replace them with something else of his own fancy.

6APT
6APU
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6ASM

T. F. Chapman
H. Jones
L. G. Snell
B. S. Pigg
E. D. Barcus
W. Haines
W. Minkler
G. S. Tichenor
C. Farnham
C. Wilson Jr.
J. & G. Utschig
C. R. Wallace
E. G. Mahn
R. Williams
Richmond Union H. S.
D. C. McNeely
J. H. Knost
G. Parsons (Portable)
J. H. Gunning
H. D. Thompson
J. A. Young
M. Stefanini
H. M. Keith
P. L. Toll
H. & M. Pitts
M. D. Graham
H. Becker
E. Gilbert
J. A. Betterley
J. McNeal
N. O. Glover
S. G. Estes
G. F. Zobel
C. Duncan
R. M. Farnsworth
H. Glidden
D. Van Lennep
J. Duggan
E. Gross
G. Stevens
J. M. Swindt
J. W. Cook
G. P. Johnson
G. Pittman
C. Van Sickel
L. Eaton
F. A. Rupert
G. Smith Jr.
J. Spatafore
J. J. Sawvire
E. L. Hesse
F. G. Dunnington
H. E. Christensen
R. F. Austin
E. Wyatt
R. M. Moore
T. C. Gearcy
F. S. Hannah
S. McKinley
D. V. Russell
P. Sano
F. Brinistool
E. Benloff
C. M. Robertson
R. H. Reinhart
J. L. Slater Jr.
W. Werner
Charles Leonard Elvin
B. Knopf
T. C. Anderson
B. R. Hassler

1601 Oakland Ave., Piedmont, Cal.
224 Ricardo Ave., Piedmont, Cal.
407 West Ave. 52d., Los Angeles, Cal.
405 N. Maryland Ave., Glendale, Cal.
Route 2, Box 611, Los Angeles, Cal.
212 W. Lomita Ave., Glendale, Cal.
868 Locust St., Riverside, Cal.
421 West Adams St., Los Angeles, Cal.
Thermalito Street, Oroville, Cal.
3040 Benvenue Ave., Berkeley, Cal.
1468 9th Ave., San Francisco, Cal.
3430 33rd St., San Diego, Cal.
Route 1, St. Helena, Cal.
3114 Ellis St., Berkeley, Cal.
Richmond, Cal.
1840 62nd St., Berkeley, Cal.
90 North Church, Tucson, Ariz.
El Cajon, Cal.
820 30th Street, Los Angeles, Cal.
137 16th Street, Eureka, Cal.
Weaverville, Cal.
527 Summer Street, Eureka, Cal.
211 South Orange Street, Brea, Cal.
Prospect Ave., Arcata, Cal.
510 North Milton Street, Whittier, Cal.
6784 Hollywood Blvd., Hollywood, Cal.
1117 West 45th Street, Los Angeles, Cal.
2010 41st Street, Los Angeles, Cal.
Eureka Camp, Pine Knot P. O., Cal.
108 Marengo Street, Alhambra, Cal.
1073 Lincoln Ave., San Diego, Cal.
Del Mar, Cal.
352 Lake Street, San Francisco, Cal.
3029 Baker Street, San Francisco, Cal.
Colusa, Cal.
Sutter, Cal.
Orange Street, Auburn, Cal.
115 Elm Street, Woodland, Cal.
614 East Ninth Street, Los Angeles, Cal.
77A Pearl Street, San Francisco, Cal.
580 Columbia Ave., Pomona, Cal.
Sanger, Cal.
731 South State Street, Ukiah, Cal.
854 Cedar Street, Alameda, Cal.
100 Gleason Ave., Vallejo, Cal.
390 62d Street, Oakland, Cal.
307 North Curtis Avenue, Alhambra, Cal.
729 S. Broadway, Santa Maria, Cal.
3131-A Folsom Street, San Francisco, Cal.
1850 Atlantic Avenue, Long Beach, Cal.
236 Stewart Street, Reno, Nev.
348 Fourth Street, Long Beach, Cal.
Manti, Utah.
210 West Third Street, Riverside, Cal.
4071 Ibis Street, San Diego, Cal.
252 1/2 North Main Street, Tucson, Ariz.
1525 I Street, Eureka, Cal.
Puenete, Cal.
1241 East Brill Street, Phoenix, Ariz.
113 West Ash Avenue, Brea, Cal.
1107 West 45th Street, Los Angeles, Cal.
1205 North Stoneman Ave., Alhambra, Cal.
P. O. Box 477, Claremont, Cal.
29 Birch Street, Redwood City, Cal.
60 Rivoli Street, San Francisco, Cal.
52 California Street, San Francisco, Cal.
3039 Adeline Street, Berkeley, Cal.
929 60th Street, Oakland, Cal.
268 Walsworth Avenue, Oakland, Cal.
615 Cole Street, San Francisco, Cal.
4329 Townsend Avenue, Oakland, Cal.

If the apparatus placed on the vessel is not modern, if you cannot get results from it, then it is your duty by law to notify the master to this effect, explaining to him the why and wherefore, and then it is up to him to see that things are remedied. Do you happen to know that the radio law says that such apparatus and operators are under the control of the master? Don't come and tell me that "the skipper will not listen to you." He will listen to you if you present things in a proper manner and know what you are talking about. Bear this in mind: It is your duty to notify the master, not to make alterations or substitutes without notifying him.

This practice of every operator making up some sort of a "rig," any old way, must be stopped. If it cannot be stopped by appealing to common sense it must be worked through other channels. It may be necessary to have the masters of vessels take action. After all, it is his business to see that proper apparatus is at all times available for use. It is a perfect disgrace to behold what one sees on some ships. Loose wires all over, bare joints and switches, hundreds of holes drilled in tables, bulkheads and ceiling, the whole affair looking like it had just emerged from a typhoon. What are we coming to? Does it mean that every amateur in the land must try his experiments at the ex-

pense of the safety of life and property of the Merchant Marine? Is it possible that you are so overworked with hand sending that you must put in a relay and a "bug" to send one or two messages per day, and chuck the regular sending key under the table?

Have those of you, who have been telegraphing only six months or a year already got the "cramps" so you cannot send without a "bug"? Better see a doctor about it. Is it such a great stunt in these days to hear Germany in the Pacific that it is worth \$300 to \$400 of your money in order to do so? Did you ever see the chief engineer bring a feed pump of his own aboard, because the ship's pumps were not satisfactory? Did you ever see the captain purchase a whistle and install it because the ship's whistle was not loud enough? These apparatus cost no more than a good receiving set. Why should you be the only "mutt" on the vessel? No wonder the ships' officers smile sarcastically at the "Wireless Operator!" Did you get that? If you are an experimenter stay at home and experiment. Bring out something worth while and don't go around and make a mess of every ship station you come to and, incidentally, make a fool of yourself and the rest of us.

(Signed)

CARL E. SODERSTORM.

STATIC STATISTICS

By
SQUAK MCGUFF



I was reading in the last issue of this magazine as where a contest was inaugurated in connection with my old brother-in-law 6CH, meaning he was my bitter opponent. Me and him always got along fine

till he beat my record. Us bein' bitter friends now, I think we will be quite more QSA unfriendly when he sees what I got to say about this contest.

So far so good. So further so worse.

This here contest, so I read, is limited to 50 words in describing the contents of the balloon or what connection has the balloon to 6CH's station. Now if any of you disciples of Ben Franklin are personally acquainted with Brownie you will perceive as well as I that 50 words is a myth. Furthermore, over and above or under the last statement anybody that ever LISTENED to him (I said LISTEN) because I never heard anybody get a chance to talk when in his company, as he is very polite and entertains with a languish flow of vocabulary that knocks you speechless right from the start, and before you recover from that one he follows with another. About all you get to say is Hello and Goodbye. However, you take your own chances on getting in even that as after my experiences I don't guarantee nuthin whatsoever. Yes, anyone that ever visited him, unless, of course, he is deaf, dumb and lost the sight of both eyes, will know that 50 words has absolutely nothing in common with 6CH's station.

From a numerical standpoint, of course, I have lost the contest right now, as I am particularly and enormously over the 50-word deadline. But the funny part of the whole thing is I could describe it in the briefest of brevity, but nobody would understand it but me and a few of his victims from that barrage from Fort-Under-His-Nose. If you have difficulty in locating the geographical position of that fort, look on Brownie's countenance map. It's plainly marked with a big (O) circle with a graphophone hooked up, with the proper amplification, in back of the spot to attract your attention.

Well, taking everything as a HOLE, and considering very carefully, my answer is that the balloon is obviously and ostensibly full of WIND.

P. S. —If I win the crisp notes I'll give 'em to Brownie to square myself after this.

I have had so many requests to visit my station on acct of its doing such good work I thought it would be a good idea to publish directions of how to get to it. Of course if you ain't interested you don't need to read further, but if you are follow me closely as my spelling is bad and grammar worse and I'll admit it takes close concentration to see what I'm driving at. All right, shoot. Well it's all very simple. Just go to the front office and get a written permit. Now take this permit to the elevator man. He

will give it to a guard on the top floor. The guard will inspect the pass. Here you must be prepared to submit to a physical examination if requested as persons with weak hearts may suffer a shock on sight of such a good set. I have noticed extreme nervousness in many cases, therefore I must be protected. The guard will then give it to the office boy, who in turn will present it to my secretary. He will inform you I am out.

6MX says: "Anyone hearing my station within one block please send a night letter. Anyone hearing it within two blocks please wire me collect. But anyone hearing me over three blocks put in a long distance call collect." He would be so tickled at this remarkable distance he would gladly pay a nickel.

6AR, formerly of San Francisco and Sacramento, has moved his set in the Sierras some 200 miles south and east of Fresno, where he is showing the way to the boys of that section for long distance work. He is piling up some good records, both in distance and messages handled.

6AIW, of Roseville, is in San Francisco for the summer and making considerable noise. He sure has a healthy wallop, that is far-fung, in characteristics at least.

6AS, erstwhile target for humorists and others, is no more an inspiration for comedians. The worm has turned. He struck it so rich that he now works to his entire satisfaction. If he keeps on at the present rate he will be a mark of envy instead of humor. He claims a vertical antenna turned the trick. Which all goes to show that he who laughs last is the most tickled. Heh, Heh.

Hal Shaw, formerly one of the 6BN wizards, who worked from Siberia to Wampazogas, Alabama, in their palmy days, just returned from a trip to Colusa. He reports that 6AAW is battling around 1000 into that hamlet. In the vernacular of the diamond this would indicate that 6AAW has some station. The Irish would say more power to him, but that would not be appropriate here, as he is using all the law allows now.

5ZA, Louis Falconi, Roswell, New Mexico, whom we all have heard from border to border (and then some), reports things are very slack in his section. The static is so bad that it is almost impossible to keep the fones on at this time of the season. He reports that all the boys in his section are working on their sets and constructing MORE-AMP antennae. "Watch 'em smoke this fall," he says.

TACOMA

Sunday, July 25th, the Radio Club of Tacoma gave a picnic on the shores of American Lake—a famous resort near Camp Lewis. The ceremonies began with a lunch. TED took the lead from the start and furnished the musical entertainment while devouring the watermelon. He sailed in with such relish and gusto that members of the club were fearful lest he finish first, thereby eliminating the music. The best selection was rendered with his tomato soup.

Immediately following the dinner (and musical entertainment)—selection rendered being principally the Soup Spoon Whistling Shimmy—a tug of war was started. Seattle won the silver loving cup in this event.

Following the tug of war a baseball game was next on the program. Portland walked away with the honors. The prize in this case was a "side-swiper" donated by 7BC. It had rubber contacts. Portland has a grudge

against "cooties" and is only awaiting another opportunity to eliminate one more side-swiper.

During the afternoon and evening the time was consumed by swimming, dancing and canoe parties. Airplane rides were also on the program. During the late evening a marshmallow roast was indulged in, during which Mr. Nicholson rendered several vocal spasms. His offerings were very good, only that he did not have the variety of flats and sharps that TED displayed while devouring his soup.

Portland members remained over for the Tacoma club meeting on Tuesday. The picnic program went through very nicely and was enjoyed immensely by everyone.

Seattle at last has a radio club. The title has been announced as THE TOTEM RADIO CLUB. Seattle has been going to have an organization for so long that we had given up all anticipation of such a thing. Now that they have, Tacoma and Portland are waiting and watching—waiting for an invitation to eat. TED has already gone into training and expects to make an opera glass finish.

Bremerton also is getting into the limelight with a club of some 35 members. They were represented at the last meeting of the Tacoma Radio Club, club, where the matter of amalgamation was discussed. The Bremerton plenipotentiaries spoke in favor of the connecting link. Some even going so far as to prophesize the whole Pacific Coast would soon be one huge organization. They followed this with the announcement, however, that they were not running in opposition to any club or clubs, but seek to harmonize and co-operate with them all. The plans will soon be published for the perusal and digestion of the general amateur public.

7BA was at the picnic with his saxophone quartet and the music was so tempting that even "Grandpa Laidigh" almost indulged. Owing to the fact that he had a sore footsie he was asked to give a practical demonstration of the latest in the lame-duck step. This he did and got by with it so nicely that he has been limping ever since.

LOS ANGELES

In Los Angeles we see many things. On a recent visit our Major Dillon and Mr. Dickow were madly enthused not only with Radio but also piscatorial activities. The Major landed such a big one that he consumed some three hours of his time and also his strength to land it.

It's a long story. Mr. Mott of Catalina was the host. Up to the present moment, however, I have been unable to discover as to whether there were hostesses. But where there's hosts there's hostesses. Both men, however, left their happy homes behind.

I met both men upon their arrival home. Their appearance was that of a viny ridge hero who had been gassed, shell-shocked and humiliated by the Germans. Dickow was bandaged from head to foot, while the Major was in a precarious state. "Sunburn" was what they told me. Poison oak was what it looked like. But what worries my detective instinct is how in the world they could get poison oak fishing from a launch.

Major Dillon and Dickow were enthralled with the picturesque scenery of Catalina. The wonderful beaches, and, above all, the latest in bathing suits. If they could speak French their expressions would be as follows: "Oh, zowie. Ze wonderful sights on ze beeeeeecech. Oo la la, juss like my own Parees."

And again I ask "how could they get poison oak on a launch?" They went fishing, I know. Also it sounds fishy.

Shucks!

—we sat up all night trying to assemble something new and original for this ad—and failed posilutely.

This morning we were so tired and sleepy we couldn't even get enthused over all the checks we found in the mail!

But—Holy Rheostat—wait till you see next month's ad! LOOK for it, and in the meantime be sure and send for our

June

STOCK BULLETIN and PRICE LIST

Our *Mail Order Service* is surely working hard these hot days—those Bulletins must be handy things to order from.

By the way—the new *Firth Vocaloud* is a winner and *Remler Apparatus* is as popular as the old swimmin' hole.

And—last but not least—have you heard 6XD on 325 meters? Real Radiofone Concerts every Tuesday and Friday nights between 8 and 9 with two 50-watt tubes administering the kick! 6ZX near Sacramento heard us!

Western Radio Electric Co.

550 South Flower



Los Angeles, Cal.

NEWLY DEVELOPED APPARATUS

A NEW DIAL

A non-warping, perfect alignment and smooth-running dial has made its appearance on the radio market. It incorporates the DeForest knob and Condensite dial, and is not effected by heat or exposure to the

sun. It is made in two sizes, three and four-inch diameters, and can be used with either a 1-4 inch or 3-16 inch shaft. It is being distributed by the Radio Telephone Shop of San Francisco.

HOOK'ER TO YER BULB-TUNERS

A full page ad. could not do justice to our new line of C. W. and phone equipment shown in our new 24 page catalog. Our tuners need no advertising. 10 cents brings catalog full of phone and receiving hook-ups, code and other useful information.

TRESCO, DAVENPORT, IOWA

CALLS HEARD BY WESTERN AMATEURS

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

List of Calls Heard By 6ANK I. A. Weihe, Sparks, Nevada July 1 to 28, 1921

6AAW, 6ABM, 6ABN, 6ABU, 6ABW, 6ACR, 6AEO, 6AFH, 6AFN, 6AFU, 6AGH, 6AGN, 6AGV, 6AID, 6AJH, 6AJR, 6AJS, 6AJW, 6AK, 6ALS, 6AMW, 6ANR, 6AOX, 6APH, 6AR, 6ARC, 6ARS, 6ASJ, 6AW, 6CH, 6DA, 6DF, 6DQ, 6DS, 6EB, 6EN, 6FH, 6GK, 6HH, 6HX, 6KA, 6KM, 6KP, 6KS, 6KW, 6LC, 6BC, 6OH, 6OM, 6PJ, 6PP, 6PQ, 6PR, 6TV, 6XZ, 6ZAA, 6ZK, 6ZR, 6ZN, 6ZU, 6ZX, 7BM, 7DA, 7JW, 7YA, 7ZJ.

The following calls were heard in full daylight—sun shining (one tube): 6AFN, 6ABN, 6AGF, 6AGN, 6KW, 6ABW. Also heard Avalon radiophone with sun shining. Signals QSA.

On July 26, at 8:30 p. m. I heard a fone station transmitting music. It was the station of E. A. Portal, of Los Altos. 6XA?

6AR, 6BH, 6HC, 6HD, 6HB, 6IM, 6IV, 6KC, 6MZ, 6NY, 6OD, 6OL, 6PS, 6PR, 6QA, 6TV, 6TX, 6ZB, 6ZN, 6ZU, 6ZX. 6AAG, 6ABP, 6ADK, 6AEW, 6AGF, 6AGN, 6AGS, 6AHL, 6AHU, 6AIB, 6AIC, 6ASH, 6ASK, 6ALK, 6ALP, 6APH, 6APV, 6AQS, 6AQF, 6ARC, 6ASE, 6AST, 6ASX, 6ATG.

CALLS HEARD BY 7MF, EUGENE, ORE.

Canadian 5BA, (6AE), 6AK, 6CH, 6CP, 6DD, 6DM, (6EX), 6FH, (6GF), 6HC, 6IM, 6IY, CW, 6KA, 6KM, 6LR, 6LK, 6MZ, 6PJ, 6QR, 6WQ, 6ZA, 6ZM, 6ZR, 6ZX, (6ABM), (6AIW), (6ARK), (6AMW), (6AIR), (6ALE), 6ALU, CW and phone 72S, 7AY, 7BA, 7BC, (7BK), 7CN, (7CC), (7DA), 7DJ, 7DP, 7EX, 7FL, (7GA), 7HC, (7IY), 7JW, (7KB), (7KJ), (7KM), 7KW, 7LR, (7LG), 7LW, (7MW), (7NN), 7OT, 7PK, 7QQ, (7RA), 7WT, cw, (7ZJ), 7ZM, 7ZL and 7ZZ.

Calls Heard by 6AS, San Francisco

(6AID), (6ALE cw), (6AFN), (6AFG), 6AR, 6EA, 6EB, (6DP), (6EN), *HY, (6KP), 6KA, (6OH), 6DA, 6PJ, (6SK), (6TV), 6WH, 6ZU, 7DA, 7IM, 7KJ, 7MF, 7IW, (7ZJ). Anyone hearing 6AS please QSL. Address 3675 20th St., San Francisco.

Calls Heard at 6MX, San Francisco, from April 1 to July 22, 1921.

6AR, 6AY, 6DP, 6EA, 6EB, 6EN, 6FI, 6FH, 6FJ, 6FM, 6GP, 6EG, 6IC, 6JC, 6JI, 6KA, 6KC, 6KM, 6KP, 6KS, 6LC, 6LU, 6LX, 6MK, 6MZ, (6OH), (6OW), 6PP, 6PJ, 6QR, 6SK, (6TV), 6TC, 6UO, (6VX), 6WD, 6ZO, 6ZU, 6ZX, 6AAK, (6AAU), 6AAS, 6ABW, (6ABM), 6ABX, 6ACR, 6ACY, 6ADL, 6AEI, 6AEL, 6AEV, 6AFN, (6AGF), 6AID, (6AIW), 6ATH, 6AKW, 6ALM, 6ARS, 7UC, 7CW, 7DA, 7HF, 7HN, 7IW, 7KJ, 7KM, 7MF, 7QQ, 7YA, 7ZJ, 7ZZ.

Anyone hearing 6MX please QSL. All letters answered.

Calls Heard By 6AR, Northfort, Cal.

(6AK), 6AS, (6CH), (6DP), (6DS), (6EA), (6EB), (6EN), (6ER), (*FH), (6FT), (6GF), (6HC), (6KA), and C. W., (6KS), (6KP), (6LC), (6OH), (6PR), (6SK), (6TV), (6VX), (6WH), 6WZ, (6ZN), (6ZU), (6ZX), (6AAW), (6ABW), (6AFN), (6AGF), (6AHU), (6AIW), (6AGM), (6ALU), (CW), (6AMN), (6APH), (6AQU), (6ARC), (6XAD—EW), (7DA), (7OZCW), 7OZCW, 7XFCW, (7ZQ).

Calls Heard By 7BH, Salem, Oregon

6ZA, 6IF, (6ZR), 6ZX, 6ZU, 6IZ, 6MC, 6FE, (6RN), (6FH), (6OH), (6QR), 6AB, 6AK, 6EB, 6FJ, 6JD, 6JE, 6JM, 6QM, 6PR, 6OT, (6GF), 6DP, (7AD), (7BH), (7IY), (7BQ), (7LI), (7ED), (7DP), (7JW), (7DA), (7GA), (7XF), (7ZJ), (7KB), 9WU, 9OE, 9YB, 9BW, 9FI.

Heard During July By 6SU, Stockton, California

6AH, 6AR, 6CU(CW), 6DP, 6EA, 6EB, 6EN, 6EX, 6FH, 6FT, 6FX, 6GF, 6GP, 6GQ, 6IC, 6IF, 6IL, 6IM, 6KA, 6KC, 6KP, 6KS, 6LC, 6MH, 6MZ, 6QA(C.W.), 6PJ, 6PM, 6SK, 6TV, 6XC(fone), 6XG(fone), 6ZK, 6ZN, 6ZU, 6AAW, 6ABM, 6ABW, 6ABX, 6ACR, 6AEI, 6AFN, 6AFT, 6AGF, 6AGM, 6AIN, 6AIW, 6AJE(C.W.), 6AJH, 6ALE(C.W.), 6ALM, 6AOD, 6APH, 6ARC(C.W.), 6ARG, 6ARS, 6ATG, 6XAC(fone), 7BK, 7BQ, 7DA, 7QQ, 7ZJ.

PARAGON R.A.TEN

Protection Against Regrets Absolutely Guaranteed by Originator's Name



Licensed under original
Marconi & Armstrong patents

READ 2ZL'S LETTER

This hearty endorsement of Paragon R. A. Ten from so distinguished an amateur as J. O. Smith, of Lynbrook, L. I., deserves your careful attention. Mr. Smith has had ample opportunity for comparisons, and his experience in radio lends weight to this expression of approval.

Here is the letter:

The Paragon R. A. Ten receiving set which has been in use at 2ZL station for the past two months, has proved to be entirely satisfactory in every way, and has done everything you claimed it would do. It is remarkably efficient and selective on all wave-lengths. It has proved especially satisfactory in C. W. work, because of the *entire absence* of capacity effect.

(Signed)

J. O. SMITH.

Ask your radio dealer

Ask your dealer to show you a Paragon R. A. Ten Regenerative Receiver. If he hasn't one in stock, he will quickly get one if you ask him for it.

The Seals have now been broken on all Paragons to let you see the splendid inside construction. Examine the details carefully, and you will see that Paragon is well worth its \$85.00 price. Remember, when you buy a Paragon, you get your money's worth in the splendid materials and workmanship. The marvelous selectivity and unequalled amplification cost no more than you would pay for inferior engineering principles.

RADIO CLUBS: Be sure to get the details at once about our special offer to recognized radio clubs. For a short time only you can secure a genuine Paragon for your club house, absolutely FREE.

Exclusive Wholesale Distributors for Paragon R. A. Ten and Phonetron

Descriptive folders on Paragon R. A. Ten and Phonetron, the improved type of loud speaker, sent free on request. Or send 25 cents for the CRECO catalogue—listing all the worth while equipment in use today.

CONTINENTAL RADIO *and* ELECTRIC CORP.

EXCLUSIVE WHOLESALE DISTRIBUTORS FOR PARAGON R.A. TEN AND PHONETRON

J. DiBlasi,
Sec.

Dept. G 78 6 Warren Street New York City

J. Stantley,
Treas.

RAY-DI-CO

HAS A LARGE STOCK OF

Standard High-Grade Apparatus

INCLUDING

Receivers, Transformers, Condensers, Rheostats, Vacuum Tube Sockets, Vacuum Tubes, Honeycomb Coils, Amplifiers, Variometers, Variocouplers, Insulators, Antenna Wire, "B" Batteries, 6-volt Storage Batteries, Filters, Spider-web Inductances, Ammeters, Voltmeters, Detector Control Panels, Variable Grid Leaks, Fixed Grid Condensers, Battery Potentiometers, Rotary Lever Switches, Microphones, Antenna Switches, Connecting Blocks, Condensite Celoron, Threaded Brass Rod, Screws.

MAIL ORDERS GIVEN "IMMEDIATE" ATTENTION

RAY-DI-CO

Motor Generator Units

"MIDGET"

"HYLO"

"STANDARD"

6 and 32-Volt "DYNAMOTORS"

"QUALITY" Synchronous Gap

RAY-DI-CO

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OFFICE AND SALESROOM

1547C N. Wells St.

Radio 9AG

Chicago, Ill.

JUST THE THING

FOR

C. W.

AND WIRELESS PHONE RECEPTION

Type V-1 \$5.50
Variometers

Type V-1 \$4.25
Variocouplers

We pay all postage charges

DEALERS—WRITE US FOR PROPOSITION

McGUIRE RADIO LABORATORY

Manufacturers of Radio Apparatus

1855 Church Street

San Francisco, Cal.

"B" BATTERIES

AN
EVEREADY
PRODUCT

43V. Batteries, tapped.....\$5.00
22½ V. Batteries, Navy Type..... 3.50
22½ V. Batteries, Commercial

Type 2.50

Latter two types especially adapted to
Cunningham and Radiotron Tubes.

Postage Prepaid Anywhere in U. S.

ETS-HOKIN & GALVAN

Wireless Engineers

10 Mission Street San Francisco

CORRECTION

In the August advertisement of the Atlantic Radio Company, the prices of the Westinghouse Tuner, and Detector-Amplifier were given as \$85.00. The correct price, as quoted in this month's advertisement, is \$65.00.

A STILLY MYSTERY

(Continued From Page 55)

That afternoon a Aleute kid brings me a note:

"Meet me on Gold Bluffs at four o'clock and you'll never regret it. ALICE."

Somehow the note didn't cheer me none; but I locks up the shack an' hikes the four miles up the beach to Gold Bluffs, which is up close to Cyanide Simpson's gold mine. When I gets up on the bluffs, who should I find strollin' around up there but Hell-Fire. I sits down on a rock without sayin' nothin' to him, expectin' him to go on, but he just keeps hangin' round. At last, when the hands of my Ingersoll had slipped around to near four o'clock I sees I got to do something. I goes up to Hell-Fire an' invites him to beat it.

"Go to hell!" he answers, an' takes a swipe at me. I pokes him in the snoot, an' then we clinches an' rolls around among the rocks, until at last we goes over the bluff an' falls in the bay.

The water was deep under the bluff an' cold as ice, so it was lucky that old Cyanide comes along just then in his gas-boat an' picks us up. Soon as I'd got my breath an' wits back, who does I see sittin' alongside of Cyanide but the tall stranger from the mail schooner!

"This is Mr. Wendell," says Cyanide, no-ticin' my stare. "He's the su-veyor I was lookin' fer from th' Treadwell Company—bin up to th' mine with me th' last two weeks."

Right there I begins to do some tall thinkin'.

"Say, look here," I says to Hell-Fire, speakin' to him for the first time since the plunge; "did you have a date with Alice up on Gold Bluffs?"

"I did," he says.

"So did I," I tells him. I was beginnin' to see light, but I saw a lot more when we got down abreast of Unga, an' sees the cutter "Unalga" steamin' off down the Straits of Nagai. All the codfish snallers in town was clustered up on the bluff around the wireless shack, an' they was clean wild.

"Where'n hell'n blazes ya been!" howls the Head-Cracker, as we makes the landin'. "Your shack is wrecked from stem t' stern, an' that little angel-eyed vampire's gone off in the hooch hunters' boat!"

Hell-Fire an' I sprints up into the shack—an' talk about a wreck! The walls were bored full of holes, an' planks were ripped up out of the floor; cans of lubricatin' oil were chopped open, an' the engine gas tank was split from top to bottom. There was a big hole punched through the sendin' transformer secondary; the coolin' tank was busted open; a can of yellow house paint had been smashed over the alternator, an' the gizzards of my oil condenser was lyin' in a mess of glass an' tinfoil all over the floor.

"I don't get it," mutters Hell-Fire, dazed-like. "What for?"

"I told that little sweet essence of sulphuric innocence that this was a hooch factory," I groans. "I haven't got the brains of a new-born jackass!"

Just then we hears the Head-Cracker bel-lowin' to us from among the rocks down below the shack, an' we breezes out.

"Here's what th' spook was carryin' 'round in th' dark!" he yells, pointin' to a black suitcase lyin' hid under a boulder. "Looks like little dimply darlin' fergot to

(Continued on Page 64)



This Name on Wireless Apparatus Spells "Highest Efficiency"

You do not want "amateur" wireless apparatus. You want the *real thing*, built according to best commercial and government standards. And *Signal Wireless Equipment* delights the amateur beginner, because it is built to please the more experienced professional.

R-80 V. T. Control Cabinet

This is the first V. T. control unit on the market that is wired throughout in accordance with fundamental principles, and that has all binding posts marked correctly, as to use and polarity, so that the experimenter may make use of any circuit he chooses, and get maximum efficiency, as well as accuracy and ease of control.

We use our new V. T. socket in this instrument, which will take any of the standard four-prong tubes on the market either detectors or oscillators.



R-37 Short-Wave Tuner

This instrument is the most efficient, short-wave tuner on the market, being designed on scientifically correct principles.

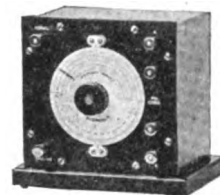
We use special H. C. coils, with taps at the proper points for controlling the wave-length range, and a small condenser with just enough capacity to cover the steps of inductance. This combination is free from the inherent defects of tuners using either inductance, alone for tuning, or capacity alone, and the results obtained with this tuner, as well as its ease of control, are remarkable.

There is more "Radio" value in "Signal" apparatus, than any so far produced for the money.



You should have the *Signal Wireless* catalog. Write for it today; it's free. Address

Signal Electric Manufacturing Company
MENOMINEE, MICHIGAN



R-44 Primary Series Condenser

For the *best* results, and *real* satisfaction in C. W. work, use our special condensers with our new dial, equipped with wave-length scale, so that your set may be calibrated with your own and aerial and ground system.

This allows close and accurate tuning, as well as the duplication of your settings, and makes your receiver serve as a wave-meter.

No other apparatus on the market has this feature to offer.

CONTEMPLATED DISTRIBUTION OF MISSOURI MARKET NEWS BY RADIO

By Daniel C. Rogers, State Marketing Bureau, Jefferson City, Mo.

THE Missouri State Marketing Bureau of the Board of Agriculture, with headquarters at Jefferson City, Mo., is working out extensive plans for giving Missouri farmers government news by radiophone.

The government market news information will be received at the radio office of the State Marketing Bureau off the leased wire of the United States Bureau of Markets. That wire will connect Jefferson City with the office of the bureau at Washington, as well as with practically all of the large grain, live stock, hay, fruits and vegetables, dairy products, and other markets in the United States.

A powerful transmitting set will be installed at the offices of the State Marketing Bureau at Jefferson City, located in Missouri's beautiful new capitol building whose dome is 280 feet from the ground. From this central point of the state the radiophone should operate at its maximum efficiency to the advantage of Missouri farmers. The services is expected to be begun early in the fall.

The Missouri State Marketing Bureau will organize the wireless amateurs in that state, of which there are several hundred, widely scattered in rural communities, into a state organization for receiving and distributing the market news information. A continued

campaign will be made to install radiophone receiving outfits in every town of any size in the state. Newspapers, banks, rural telephone exchanges, farm bureau offices, live stock shipping associations, elevators and other headquarters interested in receiving and distributing government market news information on farm products will be requested to co-operate in this new undertaking.

During the strawberry shipping season from Southwest Missouri last May the Missouri State Marketing Bureau purchased a radio receiving outfit for receiving strawberry market news at Monett, Mo., which was undoubtedly the first radio equipment ever purchased by a state or national agency for the purpose of receiving and distributing market news information for the farmer.

Similar service is being rendered in the watermelon district of Southeast Missouri, with the big watermelon shipping season opening up in that part of the state the latter part of July.

The purchasing cost of a radio receiving set does not exceed and may be less than the cost of transmitting the market news information for a single season, to market news field stations by the commercial telegraph company. There is no comparison between the swiftness of sending the news information by commercial telegraph com-

(Continued on Page 66)

CALLS HEARD BY 6BF, SANTA PAULA, CAL., MONTH OF JUNE—NO AMPLIFICATION

6AAG, 6AAH, 6AAK, 6AAT, 6ABB, 6ABG, 6ABM, 6ABP, 6ABW, 6ACU, 6ADA, 6ADH, 6AE, 6AEI, 6AFN, 6AGF, 6AGL, 6AGP, 6AHW, 6AID, 6AIU, 6AIW, 6AJK, 6AKL, 6ALI, 6ALR, 6ALU, 6ALV, (6AOZ), 6APH, 6AQU, 6AR, 6ARS, 6ATD, 6ATG, 6ATS, 6ATY, 6AX, 6BW, 6DP, 6EF, 6EN, 6EX, 6FJ, 6FT, 6HC, 6HH, 6IY, 6JI, 6KI, 6KM, 6KP, 6KS, 6LC, 6LL, 6MK, 6MZ, 6NG, 6NY, 6OH, 6PR, 6QC, 6SK, (6TG), 6TV, 6VM, 6VX, (6VZ), 6WZ, 6XAD, 6XZ, 6YA, 6ZB, 6ZM, (6ZN), 6ZR, 6ZX, 6ZZ, 7HF.

STATIONS HEARD DURING DECEMBER, JANUARY AND FEBRUARY, ON A ONE STEP, BY 7ZT, VANCOUVER,

WASHINGTON

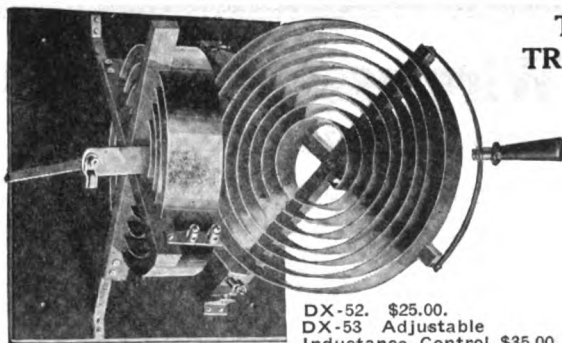
5FL, 5IF, 5XB, (5ZA), 5ZR, 5ZU, 8ML, 8ZR, 8ZY, 9AE, 9AGN, 9AIG, 9EE, 9EQ, 9HM, 9JN, 9LA, 9LR, 9OE, 9WU, 9XI, 9YI, 9YW, 9ZC, 9ZJ, 9ZL, 9ZN, 9ZQ.

Besides this list of "Calls heard" 7ZJ (ex 7CU) has been reported heard by 9AHG, Conneaut, Ohio; 8ZY, Defiance, Ohio; 9DIL, Milwaukee, Wis.; 9KL, Spring Valley, Ill.; 9AAF, Indianapolis, Ind.; 5AL, Greenville, Texas, and by George Sturley (ex 7BJ), opr. S.S. Reuce, while docked at Chignik, Alaska, a distance of 1600 miles.

CALLS HEARD AND WORKED DURING THE MONTHS OF MAY AND JUNE BY

WITH DUE APOLOGY

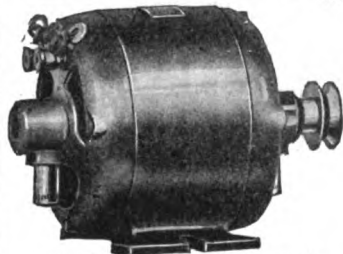
One paragraph of our August issue Raditorial states that "Pacific Radio News" is the only radio publication not connected, more or less, with the radio trade. This paragraph should have read: "—not connected with the trade, associations or organization—". It was not the intention of the writer of the Raditorial to cast reflection upon the A.R.R.L. or "QST," as he himself is a member and booster of that organization.



THE ANSWER TO TRANSCONTINENTAL TRANSMISSION

Use apparatus that has proven best. Ask 6AK and old 6EJ of Walnut Grove, Cal., about 8ZR's signals, or 7ZJ of Vancouver, Wash., and then decide upon the "DX" O. T. and Synchronous motor combination.

DX-52. \$25.00.
DX-53 Adjustable Inductance Control \$35.00.



Add \$3.50 to list for 25 cycle motors. Prices are F. O. B.

SYNCHRONOUS MOTORS

H. P.		H. P.	
1-15.....	\$28.00	1-5.....	\$42.00
1-12.....	30.00	1-4.....	50.00
1-10.....	32.00	3-8.....	58.00
1-8.....	34.00	1-2.....	75.00
1-6.....	39.00	3-4.....	99.00
1-10 H. P. 3400 R. P. M. Non-synchronous Induction Motor \$25.00.			

THE AMERICAN RADIO SALES AND SERVICE CO.

Great American Bldg. Mansfield, Ohio
Testing Station 8ZR.

HAVE YOU SENT FOR YOUR PRIZE?

(Continued From Page 48)

H. Brewer, Emeryville, Cal.; A. E. Bessey, Sunnyvale, Cal.; T. House, Dublin, Texas; M. Apple, McKinney, Texas, and R. Scott, Douglas, Ariz., also received a UV200 bulb, donated by the Radio Corporation of America. Winners can secure the tubes by writing to the "QST" at Hartford, Conn. L. Peine, of Houston, Texas, received a Cunningham C-300 tube, donated by the Audiotron Mfg. Co. M. Koupal, Eugene, Oregon, received a one-year subscription to "Radio News."

From all indications the West made a grand showing in the Relay, and "Pacific Radio News" herewith extends congratulations to the winners and conductors of this interesting test.

The October issue of "Pacific Radio News" will be out on September 25. Several additional pages of reading matter and a number of generous improvements will tend to make it a most interesting edition. Better subscribe today.—Advt.

The Biggest Radio Offer You Ever Heard of!

By special mutual arrangement between the publishers, the three big radio magazines of the country are made available for a limited time at a special rate when ordered together—

"Pacific Radio News," pioneer journal of Western radio development;

"Q S T," devoted wholly to amateur communication, and the official organ of the A. R. R. L.;

"Radio News," the newsiest and best illustrated radio periodical in the world.

Don't miss this opportunity to secure the best contemporary radio literature of America coming to your door every month for a year—at a saving in real money, too. Send in your subscription today!

All for
One Year
For

\$5.00

PACIFIC RADIO NEWS

151 Minna St.,

San Francisco, Cal.

VARIABLE—ACE "B" BATTERIES—PLAIN

Insist on Getting THE BEST "Ace" "B" Batteries or Write to Us
DEALERS—Sell the "Best" and Increase demand. Write for Catalog No. 15

Cat. No.		Size	Voltage	Hrs. Ser.	Lbs.	Taps.	Price.
623	Plain	2½ x 2 x 3½	22½	400	1		\$1.50
623	Variable	2½ x 2 x 3½	22½	400	1	5	1.75
625	Plain	3 x 4 x 6½	22½	1400	5		2.50
625	Variable	3 x 4 x 6½	22½	1400	5	5	3.00
626	Plain	3 x 8 x 6½	45	3000	10		5.00
626	Variable	3 x 8 x 6½	45	3000	10	6	6.00

A few of the dealers handling Ace "B" Batteries

Am. Elec. Tech. Appliance Co., New York
Continental Radio & Elec. Corp., New York
Dreyfuss Corporation, New York
W. B. Duck, Toledo, Ohio
Wilcox Lab., Inc., Lansing, Mich.

Hygrade Elec. Novelty Co., New York
Manhattan Elec. Supply Co., New York
M. Muller, Boston, Mass.
Vimy Supply Co., Toronto, Canada.
Whitall Elec. Co., Springfield, Mass.

See page 79 for our new Ace type 45 volt variable "B" Battery

ACE BATTERY MFG. CORP.

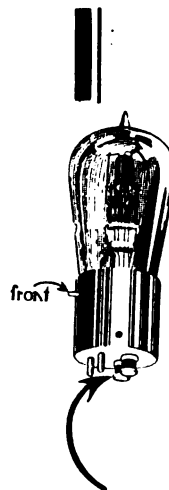
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Phone Main 8379

BROOKLYN, NEW YORK

When writing to Advertisers Please mention Pacific Radio News

Is there a Crepe On Your Vacuum Tube?



Your last vacuum tube would still be "alive" and the money you paid for a new one would be in your pocket if its filament had been protected with a

RADECO Safety Fuse

(patent pending)

Because of the insignificant cost, and absolute protection against high amperage, RADECO Safety Fuses are now a standard part of every efficient wireless set.



NOW, while your tube is in perfect condition, pin one dollar to this advertisement and be guarded against all future vacuum tube expense.

Send for list of special prices on all well-known equipment.

Radio Equipment Co.

630 WASHINGTON STREET,
Boston, Mass.

New Price

RADECO Safety Fuses come in ¼, 1, 1½, 2, 2½ and 3 amp. sizes. Slip directly on filament terminals of any standard bulb used in any standard socket. Sent postpaid.

\$1.00

Four for

RADIO APPARATUS

*Distributors of Reliable Radio Apparatus to Schools, Colleges, Radio Clubs and Experimenters
All Over the World!*

"PITTSO"

SERVICE FILLS ORDERS ON
EVERY CONTINENT!

WHY NOT LET US SERVE YOU?



"PITTSO"

SERVICE REACHES ALL OVER
THE WORLD!

WHY NOT LET IT REACH YOU?

AMPLIFYING TRANSFORMERS

No. UV-712 Radio Corporation, new type, just out. (For radiotrons) ...\$7.00
No. 226-W Federal 7.00
No. 231-A General Radio, new type.. 5.00

MODULATION TRANSFORMERS

No. A-3 Acme, unmounted 4.50
No. A-3 " semi-mounted 5.00
No. A-3 " fully mounted 7.00
No. 231-M Gen. Radio, new type, just out! (for radiotrons) 5.00

AUDION CONTROL PANELS.

No. RORH Grebe, in cabinet with tickler connections17.00
No. 330 Remler, with "A" Battery potentiometer 8.00
No. P-1 Paragon, moulded type, very small and compact 6.00

"B" BATTERIES.

No. 7623 Standard, small 22.5 volts.. 1.50
No. 7625 " large 22.5 volts.. 2.65
No. 7650 " variable 22.5 volts 3.50
No. 766 Eveready, large 22.5 volts.. 3.50
No. 766-A Eveready, large, variable.. 3.00
No. 763 Eveready, small, 22.5 volts.. 2.25
No. P-1 "Sorsinc", new type, just out! 22.5 volts, extra long life.... 4.00

AMPLIFIERS.

No. RORK Grebe two-step with automatic filament control55.00
No. RORD Grebe Det. and two step with automatic filament control... 75.00
No. P-1 Amrad Type A, two step.. 39.50
No. DA Westinghouse, det. and two step, just out! 65.00

CONDENSERS. (Fixed mica type)

No. ROCC Grebe .0002 Mf. 1.00
No. ROCD " .0005 Mf. 1.20
No. ROCE " .001 Mf. 1.60
No. ROCF " .005 Mf. 3.80
No. ROCA " .0002 Mf. and .5 meg. leak 1.20
No. ROCB " .0002 Mf. and 3 meg. leak 1.20

GRID LEAKS.

No. MW-1 Radio Corporation, .5, 1, 1-5, 2, 3 or 5 megohms complete... 1.25
Grid leaks only75
Bases only50
No. 21 Chelsea, variable .5 to 5 megohms 3.00

LOUD SPEAKING DEVICES

Type R-3 Magnavox loud speaker, latest model, just out!.....45.00
No. P-1 "Vocoloud" Station type...30.00
No. P-2 " Laboratory type...25.00
Magnavox Radiophone transmitter tone-arm37.50

REGENERATIVE RECEIVERS.

No. CR-2 Grebe 175-680 meters....\$41.00
No. CR-3 Grebe 175-680 "Relay-special"; splendid set65.00
No. CR-3A Grebe 175-375 meters, with tube control, complete set36.00
No. CR-5 Grebe 175-3000 meters, "Super-special" with tube control, complete set. Ideal for jewelers....80.00
No. CR-6 Grebe 175-680 meters, receiver, det. and two step amplifier self contained, complete set200.00
No. CR-7 Grebe 500-20000 meters "Long-wave special" with tube control, complete set. Ideal for arcs 210.00
No. RA Westinghouse, 180-700 meters, new type, just out!.....65.00

PLUGS.

No. 50 Pacent universal type 2.00
No. 1428-W Federal, brass 2.00
No. 1428-W " silver-plated .. 2.50

JACKS.

No. 1421-W Federal open circuit70
No. 1422-W " closed circuit .. .85
No. 1423-W " two circuit 1.00
No. 1435-W " automatic filament control type 1.20
No. 1438-W Federal Auto filament type 1.50

MICROPHONES.

No. 260-W Federal hand type 7.00
No. HM-100 DeForest hand-type 6.00
No. 5176-A Conn. with short adjustable arm, ideal for panels 4.25

RHEOSTATS.

No. 214 General Radio 2-5 Ampere type, just right for one UV-202 5-watt radiotron tube 2.50
No. 132 National Controller type, 6.4 amperes, just right for 1 UV-203 5-watt radiotrons 5.50
No. P-1 Paragon, very compact 1.75

SOCKETS.

No. MW-1 Radio Corporation type... 1.50
No. 156 Gen. Radio 1.50
No. 550 Murdock 1.00
No. S-2 Radio Service double 2.50
No. S-3 Radio Service triple 3.50
No. UV-203-A Radio Corporation type for the UV-203 50-watt tube 5.00

RECTIFYING DEVICES.

No. P-1DeForest rectifying tubes for radio-phone work 7.00
No. FF France battery booster, 6 amps, for charging batteries15.00

RECTIFYING DEVICES.

No. P-1 Tungar 2 amp. size complete.\$18.00
No. P-2 Tungar 5 amp. size complete 28.00
No. UV-216 Radio Corporation 20-watt "Kenotron" Rectifier 7.50

TELEPHONES

Type C Baldwins, Navy type\$16.50
Type E Baldwins, ultra-sensitive ...20.00
Type F Baldwins small, super-sensitive21.00
Brandes "Superiors" 8.00
" "Trans-atlantics"12.00
" "Navy type"14.00
" New headband only 1.50
" New double cord75

VACUUM TUBE. (Radiotrons)

No. UV-200 Radiotron detector 5.00
No. UV-201 " amplifier 6.50
No. UV-202 " 5 watt transmitter 8.00
No. UV-203 Radiotron 50 watt transmitter30.00
No. UV-204 Radiotron 250 watt transmitter110.00
Note: All radiotrons sent postage and insurance prepaid to any part of U. S. A. Radiotrons always in stock.

STORAGE BATTERIES.

No. BX-3 Harvard 6 volts 40 ampere-hours, complete16.50
No. BX-5 Harvard 6 volts 60 Amp-hours18.50
No. BX-7 Harvard 6 volts 80 Amp-hours24.50

VARIOMETERS.

No. 200 Tuska, moulded type 6.25
No. 200-A Tuska, moulded type with dial 7.25
No. 345-G Murdock grid type 7.50
No. 345-P Murdock plate type 7.50
No. 346 Murdock Vario-coupler 8.50
No. ZRV Clapp-Eastham Variometer with dial 6.50
No. ZRV-A Clapp-Eastham Variometer only 5.75
No. P-1 Turney's spider web inductance; ideal on radio-phones 5.50

POTENTIOMETERS.

No. 214-C General Radio "A" Battery type, 400 ohms, ideal with radiotrons 4.00
No. 93 Remler "A" Battery type... .75
No. F-743 Clapp-Eastham "B" Battery type, 5000 ohms, fully mounted For panel mounting 3.00
No. PR-536 Radio Corporation "A" Battery type 2.00

RESISTANCES. (Phone work)

No. 1 Ward Leonard 6000 ohms 2.25
No. 2 Ward Leonard 1000 ohms..... 3.50

"Let 'PITTSO' products, super-service and delivery solve your Radio problems"

SEND US YOUR ORDERS TODAY!

Send ten cents in stamps for Catalog No. 22. Over 100 pages, over 150 illustrations, over 600 items.
Our Foreign Department is especially qualified for handling orders from customers in Alaska, Hawaiian Islands, Australia and the Orient!

F. D. Pitts Co., Inc.

12 Park Square

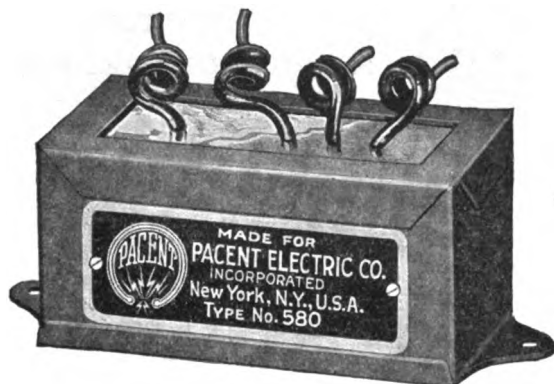
Dept. E

Boston, Mass., U. S. A.

Another Achievement

TYPE 580 DUBILIER C. W. CONDENSER

Especially
designed
for C.W.
For Antenna
Series
Use.



Triple
Capacity
0.0003 mfd.
0.0004 mfd.
0.0005 mfd.
5000 volts
4 amperes

Catalog No. 310

Price \$4.50

This latest addition to the already complete line of the Dubilier Condenser Co., will meet a long felt want of all amateurs interested in CW transmission. It was primarily designed for antenna series use and will achieve renown for the following superiorities:

Extreme Compactness	Constant Capacity	Infinitesimal Losses
Rugged Construction	Built of Ruby Mica	Easily Mounted

The Dubilier 580 Condensers are also made in the following necessary single capacities:

Cat. No.	Type No.	Capacity	Price
311	580	5000	\$4.00
312	580	5000	4.00
313	580	2500	4.00
314	580	2500	4.00
315	580	2500	4.00

Further information is contained in Bulletin D3, which will be sent you on receipt of five cents in stamps.

AMATEURS—Your Dealer Will Supply You
DEALERS—Write For Our Proposition at Once

PACENT ELECTRIC COMPANY, Inc.

LOUIS GERARD PACENT, President

REPRESENTING

The Complete Line of Wicony "Eventual" Apparatus
Standard VT Batteries Pacent Plugs Rawson Instruments
Dubilier Condensers Duo-Lateral Coils Seibt Apparatus

Special Distributors of Brandes Phones

150 NASSAU STREET TELEPHONE Beekman 5810 NEW YORK CITY

A STILLY MYSTERY

(Continued From Page 60)

tell her hooch huntin' pals t' pack it away."

I recognizes the suitcase as one of those of Alice Loring's that I'd seen the day she came. We opens the thing—an' then we stares. Neatly stowed inside was six dry batteries and a spark coil, about a one-inch, with a key an' a little enclosed micrometer spark gap screw on top. Besides this there was two coils of thick silk cord, a small electrose strain insulator with a hook at each end, a sharp-pointed brass rod, an' two wrenches. There was no receivin' gear.

"Sufferin' damnation!" howls Hell-Fire, doublin' up like he was shot. "I'm a fish—I'm a salmon!" an' he starts eruptin' a blaze of profanity that makes the rocks smoke.

"One of the gobs at N-P-R give me a complete line on this dame a couple years ago," he snarls. "She's Soft-Eyed Sadie, th' slickest female gumshoer in th' Alaska dry squad. She used to get next to the hooch plants by lovin' up some simp, an' then she'd shoot the dope out to the cutter in code—but the ops used to suspect th' code an' tip off th' boys, so she got up this rig. When she has her dope lined up she chooses a dark night, unfastens the lead-in an' hangs it off on that electrose insulator, an' clips that longest flexible cord onto the lead-in. The other cord an' the rod is for the ground—she must'a put it down in the water here. The cutter coples her on a three-step.

"She pulled the same stunt on th' gobs at N-P-Q once—she packed a ladder half a mile to get up to the lead-in, an' when she couldn't get th' lug off she got into the station with a passkey durin' the night an' opened the aerial swich—course she'd had the simps to show her around the place beforehand. Nobody ever saw her rig, but an op on the cutter spilled the details to one of the captured gobs when he was brought aboard prisoner by the hooch hunters. She must'a left it hid here last night, intendin' to take it off in the boat today, an' forgot it."

"I guess that's how Greasy Bill's ladder disappeared," I says; an' then we observes that we're all standin' on that very thing."

"I s'pose my bottle of hooch went, too," glooms Hell-Fire, when we were alone, a little later. "It was in your shack."

"No; it's saved," I announces. "I had a hunch this mornin' an' put it down in the fish shed."

And that night we drinks it all. Next mornin' I recovers consciousness lyin' on my chest over the top end of one of my hundred an' thirty foot wireless masts. Lookin' around, I observes Hell-Fire droopin' similar over the end of the other one.

"Good mornin' to you," I hollers across to him. "How's your busted heart?"

"All healed," Hell-Fire hollers back. "To hell with women!"

"Hell with 'em," I agrees, an' then we climbs down an' shakes hands.

THE END

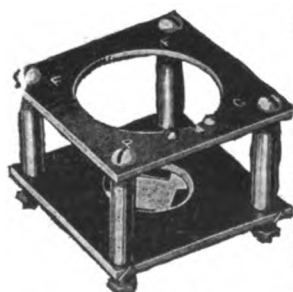
Something New

Made to Please You and
Priced to please your
pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy easily mounted socket that is heat proof, has bakelite-dilecto insulation, handy binding posts, etc., all for 75c.

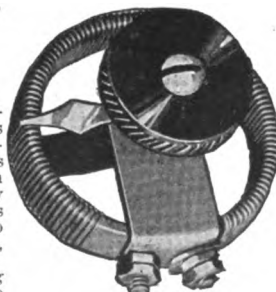
And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount, has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

The Wilcox Laboratories
LANSING, DEPT. J., MICHIGAN



Type 126, Tube Socket

Price 75c Postpaid



Type 122 Rheostat

Price 90c Postpaid

FRESNO AMATEURS

Mr. Mason Ports announces to the amateurs of Fresno and vicinity that he has opened a radio supply store. A complete line of parts and many standard pieces of radio apparatus will be stocked.

QST RADIO SHOP

3265 Belmont Ave. Fresno, Cal.

RADISCO

"Your Assurance of Satisfactory Performance"

RADISCO COUPLERS, COILS, "B" BATTERIES, AND OTHER GOOD INSTRUMENTS ARE FOR SALE AT 28 RADISCO AGENCIES ALL OVER THE U. S. SEE RADISCO SPREAD IN SEPTEMBER RADIO NEWS.

Consider your Battery:**EVEREADY**

The best wireless B battery is none too good for you.

Unusual results in range and clearness are being secured by the users of Eveready wireless batteries, because they are built especially for radio uses and with a full knowledge of radio requirements.

Eveready wireless batteries are made by the world's largest manufacturers of dry cell batteries and are members of a family holding a long and honored record of achievement.

The Eveready label is a guarantee of a superior battery—and results.

For sale by electrical dealers everywhere.

National Carbon Company, Inc.

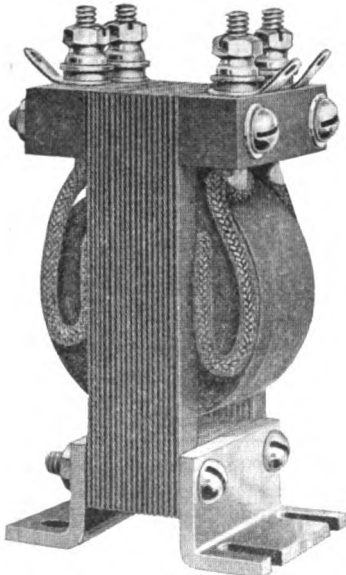
599 Eighth St., San Francisco, Cal.



No. 774

Number 774 B Battery is made up of 27 cells connected in series. The wooden case containing this battery is impregnated with melted paraffine and solidly packed and sealed in paraffine with a half-inch of sealing wax added after the cells are in place, making of the whole a unit impervious to moisture. One negative and six positive terminals have heavy brass screws and nuts. This battery allows a range of 18 to 43 volts in steps of $4\frac{1}{2}$ volts. Dimensions over all, 9 inches by 3 7-16 inches by $3\frac{1}{8}$ inches deep. Price \$5.00.

Federal Standard Radio Accessories



No. 226-W—Type A
Audio Frequency Transformer

ANNOUNCING

A Material Price Reduction
on the Famous Federal
Amplifying Transformer

Reduced Price \$7.00

Federal 226-W Transformer will give Maximum Amplification
with all types of Standard Tubes on the market

*Write for Bulletin 102-WB and C Circular
describing New C-W Accessories*

Ask Your Dealer for Federal Products. If he does not have them, tell us his name

Federal Telephone & Telegraph Company

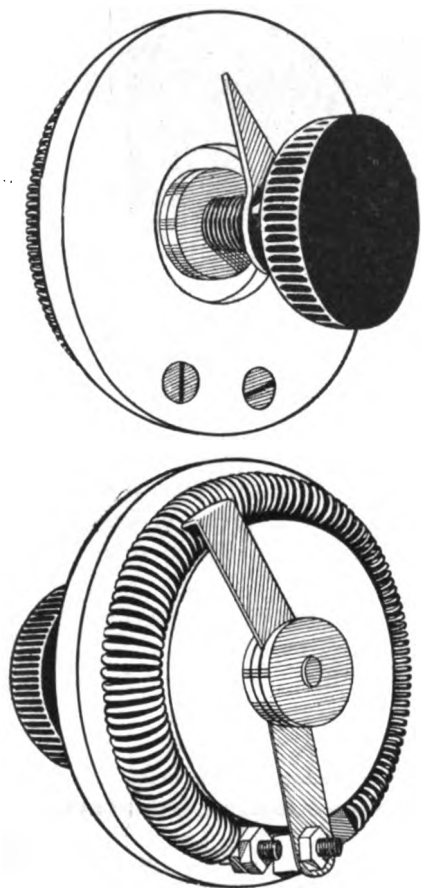
BUFFALO, NEW YORK, U. S. A.

MANUFACTURERS OF STANDARD RADIO ACCESSORIES

When writing to Advertisers Please mention Pacific Radio News

SHRAMCO

-- REO --



For your power tube --

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

A BACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2½ in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt. Detector and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2½ in. base.

SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

CONTEMPLATED DISTRIBUTION OF RADIO MARKET NEWS BY THE MISSOURI STATE BOARD OF AGRICULTURE.

(Continued From Page 61)

panels and radio to a field station from either St. Louis or Kansas City.

A radio receiving set is now being operated by the State Marketing Bureau at Jefferson City to receive government market news information now broadcasted daily from the KDEL office operated by the Post Office Department at St. Louis, Mo. This information is being given to local newspapers and the Associated Press.

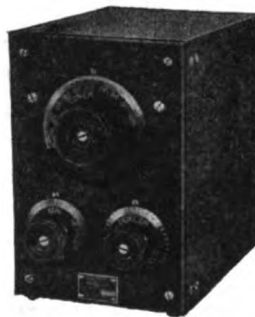
The plans for putting into operation this most elaborate system of distributing market news information to farmers ever undertaken by any state, or even the Federal Government, has been generally pronounced feasible by the majority of the larger manu-

facturers and jobbers of radio equipment.

At first no attempt will be made to expand the work in Missouri further than installing receiving sets at some important office in each of the several important towns of every one of the 114 counties in Missouri.

Sufficient interest has already been expressed in the project to warrant the belief that farmers, bankers, county agents, newspapers, rural telephone exchanges, dealers in farm products, merchants and others, will liberally subscribe to the purchase and maintenance of one of these radiophone outfits in their respective communities, which cost would be only trivial when thus apportioned between the leading citizens of a given community. In fact, the cost for maintaining such a service by individuals is not expected to be prohibitive within the near future. In view of which fact, the State

(Continued on Page 79)



Westinghouse Radio Equipment

Westinghouse Radio Equipment embodies the latest ideas in receiving equipment, providing a most efficient set for telegraph and telephone reception over the amateur and normal ship wave-length ranges. Type R. A. Short Wave tuner, Style 307189, responds to a wave-length of 180 to 700 meters and is especially selective. Type D. A. detector-amplifier, Style 307190, combines a vacuum tube detector with a two-stage amplifier. Both units are mounted on Micarta panels attached to a polished mahogany cabinet. Simple in design—easy to operate—single-tuning circuit. Highly efficient.

"Radio in a New Role," the Westinghouse folder, gladly sent on request.

PRICES:

Type R. A. Tuner \$65.00. Type D. A. Detector-Amplifier, \$65.00.
Type R. C. Combination of first two units mounted on single cabinet, \$125.00.

Bulletin 14 sent on request to any reader of the Pacific Radio News.

ANNOUNCEMENT

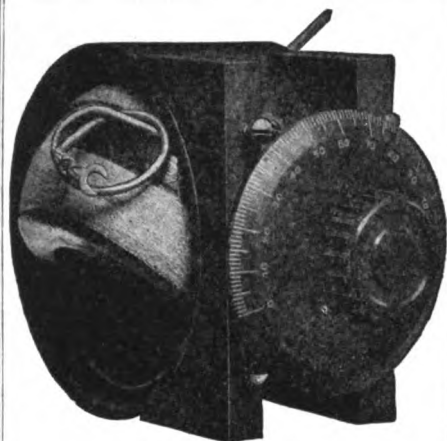
WE take pleasure in announcing a change of location of our Boston store—we are now situated at 727 Boylston Street, in the heart of the Back Bay business section, quickly reached by train or trolley. Additional floor space and an additional sales force enable us to give every customer prompt attention. This applies to mail orders as well as over-the-counter purchases. We cordially invite you to inspect our new store.

ATLANTIC RADIO COMPANY

Incorporated

727 BOYLSTON ST.,
BOSTON, MASS.

Branch, 15 TEMPLE ST.,
PORTLAND, ME.

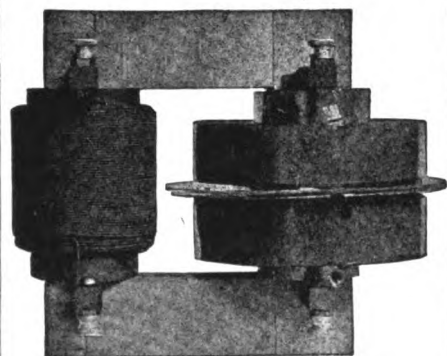


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry max to .1 mil henry minimum. Is readily used on table or mounted on panels.

Completed with 3-inch dial and knob \$6.50

Without dial or knob..... \$5.75



TYPE Z, R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps

Receive Wireless Telephone Concerts in Your Own Home

PICK up radio phone concerts, time signals, ship, shore and amateur stations, right in your own home—with an ABC receiving UNIT. Simple to operate—no license, battery or special knowledge needed. Price of Unit alone, \$24.50. Phone, aerial, all equipment to complete station included in ABC "Complete Package" for \$75.00.

Send 10 cents for our 16-page booklet, "How I Put Up a Complete Radio Station in 3 Hours," an actual story that you can duplicate. Request Booklet X-9

Wireless Equipment Co. Inc.
Newark, New Jersey

ABC UNITS
Standardized Radio Sectional Receiving

STATIC ELIMINATION

By Hubert E. DeBen

ALL attempts at static elimination have failed. It is a universally known fact. Practically every one of us has tried, at some time or other, a contrivance of our own design, in an attempt to do away with static. As usual, the result is a complete failure. And why all this failure? Simply this: Heretofore nearly every experimenter has tried to eliminate static by trying to keep it out of the receptor circuit; naturally the audibility of radio signals were reduced in proportion to the static audibility. It is impossible to eliminate static altogether, but IS possible to reduce its intensity so that radio signals can be read through it.

Let us determine what static is, what it is caused by, and how. The following theorization of static is based on the popular theory of electricity and may be accepted as substantial. All clouds contain two electric fluids, called negative and positive electricity; in any uncharged cloud these fluids exist in equal amounts; the fluids are separated from each other by friction, so that one of the two clouds, which rubbed together, retains a surplus of one fluid, while the other cloud has a surplus of the other fluid; each cloud is thus charged oppositely; clouds carrying opposite charges, when coming in contact with one another, in an effort to re-attain their normalcy, discharge to each other their surplus of either fluid; this electrical discharge causes the atmospheric disturbance which is commonly termed static.

The striking electrical similarity of radio and static disturbances is that they are both etheric disturbances caused by discharges of an electrostatic nature. They are both alike electrically; it is, therefore, logical that one

(Continued on Page 72)

To all SUNKIST RADI-O-ITES

Finding that the express charges on the heavier goods from the East are so high as to eat up the profits, I withdraw my offer to deliver in California free of transportation charges.

Paul F. Johnson,
ALTADENA RADIO LABORATORY,
Altadena, California.



THE—

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3/4 inches. 90 cents—5c Postage.

NEW R-DISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G8. 4 West Park St.,
NEWARK, N. J.

THE RADIO TELEPHONE REPORTER

(Continued From Page 52)

other public gathering places; nearly 100 in all. A nominal admission fee was charged on the day of the fight, and the voice bulletins sent by the big station at Hoboken

\$5 \$3 WIN A PRIZE \$5 \$3 \$2 \$1

For the man writing the best true story of how he stopped an unlicensed amateur from operating, with satisfaction to both parties, we will give a prize of \$5.00. Second best story \$3.00, third best \$2.00, and fourth best \$1.00. The winning story will be published in PACIFIC RADIO NEWS and will be paid for at usual space rates in addition to the prize of \$5.00.

were heard by the crowds almost simultaneously with the time of their actual happening at Jersey City. The returns from these sources were turned over to the two organizations mentioned above.

Apparatus Employed

The apparatus consisted of a 1500-watt radiophone transmitter employing six 250-watt radiotron vacuum tubes. These vacuum tubes, by the way, are the lamps which have well nigh revolutionized the radio field and which directly make radio telephony possible today.

A special motor-generator was erected near the set which furnished a potential of 2000 volts necessary for the plate excitation of these vacuum tubes. The filaments of the tubes were heated by means of a separate low voltage winding arranged on the machine. The vacuum tubes and all other auxiliaries are contained in one unit, as shown in one of the above photographs, the panel of which contains all necessary

switches for power control and wave lengths. The set was built by the General Electric Company expressly for the Radio Corporation.

The antenna, which is clearly shown in the second photograph, was stretched between the skeleton steel radio tower shown and the clock tower of the D. L. & W. terminal. It is of the "T" type and consists of four No. 14 stranded phosphor-bronze wires, 450 feet long with a 250-foot lead-in. It has a natural period of 740 meters and spreads about 250 feet above the ground. This antenna was energized by a current of 15 amperes furnished by the transmitter which in radiophone circuits is considered a great deal of current to radiate in the air. The wave length to which it was necessary for radiophone receivers to tune up to was 1600 meters.

Reporting the Fight

The actual reporting was done in the following manner: Mr. D. Sarnoff, general manager of the Radio Corporation of America, and Mr. J. A. White, editor of Wireless Age, were located at the ringside in the press stand and took turns at reporting the most important features over a private telephone wire furnished for the occasion through the courtesy of the American Telegraph and Telephone Company, leading direct to the radio room at the Lackawanna terminal. The news was given round by round and incident by incident, and at the other end were typed directly from the telephone and handed to the radiophone operator, Mr. J. O. Smith, a well-known radio amateur, in the form of bulletins. The latter immediately spoke into the regular mouthpiece shown on the radiophone panel, so that hardly a minute was lost between the actual incident and the spoken voice in the air.

Several thousand letters have since been received by the Radio Corporation from amateurs located up to distances of 500 miles from the scene of action remarking upon the unusually clear voice of the speaker and enthusiastically voicing their approval at the success of the experiment, for it was the first time in the history of radio that the results of a boxing match were broadcasted by radio telephone.

Robert Garcia, youngest amateur in the world, was the main feature of attraction at a recent meeting of the Southern California Radio Association at Los Angeles. Radio Inspector Dillon was one of the distinguished persons present. Young Mr. Garcia made a very nice little talk in which he thanked Major Dillon for his license. The young lightning-shaker is just 7 years of age and holds an amateur first grade ticket. He took a great liking to the radio inspector and sat upon his lap during the session.

Master Garcia was presented with sufficient apparatus by the various manufacturers of Los Angeles to complete a set he is installing.

The Last Word in "B" Batteries

Introducing the

New Ace 627-45 Volt Variable "B" Battery at \$3.50



Made of the same high grade material and workmanship as all our Ace types. This Battery will absolutely fulfill any B Battery requirements. The special size cell construction guarantees from 75 to 100 per cent more service than any small size "B" Battery. Thirty voltage readings from 1½ to 45 volts obtained. Size Weight

Another important feature is the shelf-like depreciation, which is guaranteed against more than 10 per cent in 6 months.

For other type "B" Batteries and Dealers, see our ad on page 62

44 Court St., Brooklyn ACE BATTERY MFG. CORP. Phone Main 8379

10c CHARGES YOUR BATTERY

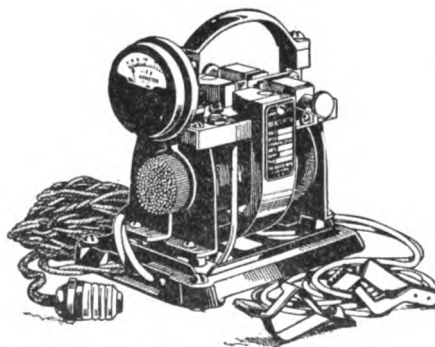
AT HOME WITH AN F-F BATTERY BOOSTER

and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? A Storage Battery kept fully charged lasts longer and everything depending upon it works better, which is the secret of perfect battery service, and a Booster insures this. Do not run the risk of ruining an expensive battery, for it costs less to buy a BOOSTER than to be without one. The F-F Battery Booster is a Charging Apparatus, unfailing in its ability to deliver service day and night, is rugged and foolproof and requires no skill to operate. They charge automatically and operate unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. The Ammeter shows you just the amount of current flowing. Easily renewable and adjustable carbon electrodes rectify the current and last for thousands of hours. Everything is complete in one compact, self-contained and portable unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Current. New models now at PRE-WAR prices:

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes	\$15
Type 16 charges 6 Volt Battery, at 8 Amperes	\$24
Type 166 charges 6 volt Battery, at 12 Amperes	\$32
Bantam Type 12 charges 12 Volt Battery at 5 Amperes	\$15
Type 112 charges 12 Volt Battery, at 6 Amperes	\$24
Type 1612 charges 12 Volt Battery, at 7 Amperes	\$32
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes	\$48

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights Complete with AMMETER & BATTERY CLIPS, 11 to 15 lbs. Order from your Dealer, or send check for prompt express shipment. If via parcel post, have remittance include postage & Insurance charges, or have us ship C.O.D. ORDER NOW, or WRITE for FREE Descriptive BOOSTER BULLETIN No. 33.

WIRELESS OPERATORS, EXPERIMENTERS, CAR OWNERS, STORAGE BATTERIES USERS



SERVICE STATION CHARGING SERVICE AT ANY LAMP SOCKET

Other F-F Battery Boosters charge batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. It actually costs you less to buy an F-F BATTERY BOOSTER than to be without one. It fills your battery with life.

BATTERY CHARGING STATIONS and GARAGES Use Our Large F-F ROTARY RECTIFIERS for Group Charging. Real Economy in first cost and in service. Charges up to 36 cells. Full Wave, Automatic, Dependable. It will also Rectify High Voltage. If the 110 Volt Primary of a high voltage transformer is connected to the Direct Current side of the F-F Rotary Rectifier, the secondary will deliver high voltage Uni-directional Current, suitable for Radio Work. Write immediately for New Free Descriptive ROTARY BULLETIN No. 33A, which gives complete information.

THE FRANCE MFG. Co.

Gen. Offices & Works, Cleveland, Ohio, U.S.A.
Canadian Representative: Battery Service & Sales Company, Hamilton, Ontario, Canada.

AUDIOTRONS

Double Filament, Detector, Amplifier, Oscillator—

With Adapter\$6.00
Without Adapter\$5.00
DREYFUSS SALES CORP.
179 Greenwich St., New York City

BRASS SWITCH CONTACT POINTS

Price with ½-inch screw.....\$0.20 doz.
Price with shank and brass nut .30 doz.
Price of extra nuts for same... .10 doz.
Add Postage

Order from Ad. Satisfaction guaranteed.
Immediate Delivery—Try us

STRATTON ELECTRIC COMPANY
215 Federal St. GREENFIELD, MASS.

MEYBERG

The Largest Radio Stock on the Pacific Coast

San Francisco

Send for 32 Page Remler
Catalogue — Just off Press



Los Angeles

Everything the
Amateur Wants

Stocks Guaranteed—Prompt Service from either address

VACUUM TUBES

C300 Cunningham Detector	5.00
C301 Cunningham Amplifier	6.50
C302 Cunningham 5-Watt Power	8.00
C303 Cunningham 50-Watt Power	30.00
UV200 Radiotron Detector	5.00
UV201 Radiotron Amplifier	6.50
UV202 Radiotron 5-Watt Power	8.00
UV203 Radiotron 50-Watt Power	30.00
Moorhead Electron Relay	5.00
Moorhead VT Amplifier	6.50
Moorhead VT Transmitter	7.50
Moorhead Rectifier Tube	9.75

All tubes postage prepaid.

AMPLIFYING TRANSFORMERS

231A General Radio	5.00
226W-Federal	7.00
A2 Acme, Unmounted	4.50
A2 Acme Semi-Mounted	5.00
A2 Fully Mounted	7.00
UV712 Radiotron	7.00

EVEREADY BATTERIES

765 Small 22½ Volt B	2.50
766 Large 22½ Volt B	3.50
774 Variable 43 Volt B	5.00
746 Special 108 Volt Amp. B	16.50
6 Volt 40 Amp. hr. Storage	18.20
6 Volt 60 Amp. hr. Storage	20.80
6 Volt 80 Amp. hr. Storage	24.05

REMLER APPARATUS

500 Moulded Bakelite Variometers	6.00
503 Moulded Bakelite Variocouplers	5.40
100 3-in. Bakelite Dial and Knob, 3-16 in. or 1-4 in.	1.00
330 Detector Panel Moulded Bakelite	8.00
331 Amplifier Panel Less Transformer	6.00
333 Amplifier Panel Less Transformer (With cam switch.)	9.00
810 Jr. Rheostat	1.00

REMLER APPARATUS

813 3 Amp. Panel Type Rheostat	1.75
94 A Battery Potentiometer Unit	.75
94 Knob and lever for above	.45
96 Variable Grid Leak	.60
97 Fixed Grid Condenser	.35
400 3 Coil Mounting on base	6.50
3 Coil Mountings for Panel Mtg.	3.60

JEWELL METERS

0-100 Milliamps Flush Mtg.	8.00
0-250 Milliamps Flush Mtg.	8.00
0-500 Milliamps Flush Mtg.	8.00
0-15 Milliamps Panel Mtg. back-con.	15.00
0-500 Volt Meter	16.00
0-1000 Volt Meter	23.00
0-1500 Volt Meter	29.00
0-1, 0-2, 0-2½, 0-5, Thermo coupled Radiation Meter Flush Mtd.	12.00

MOTOR GENERATORS

Westinghouse 100 Watt 110 Volt 60 Cycle AC 500 Volt DC	85.00
Westinghouse 250 Watt 110 Volt 60 Cycle AC 1000 Volt DC with 87 Volt Grid Bias Tap.	145.00

CW APPARATUS

Pacent Universal CW Condensers, any capacity	2.00
CW Tuning Inductance	8.00
Variable Grid Leak 8000 ohm	3.00
Wireless Shop Condenser, 0008	9.00
231M Modulation Transformer	5.00
Kellogg Transmitter	3.50
Kellogg Transmitter, adjustable arm	4.75

TELEPHONES

Brandes Superior	8.00
Brandes Trans-Atlantic	12.00
Brandes Navy	14.00
Baldwin Type C Navy	13.75
Baldwin Type E	15.00
Baldwin Type F	16.25
Murdock No. 55 2000 ohm	4.50
Murdock No. 55 3000 ohm	5.50

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Federal 1421 open Circuit Jack	.70
Federal 1422 single Circuit Jack	.85
Federal 1423 double Circuit Jack	1.00
Federal 1435 automatic Filament Control Jack	1.20
Federal 1438 automatic Filament Control Jack	1.55
Western Electric Plugs	1.30
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Pacent Universal	2.00

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92 Remler Socket	1.50
156 General Radio	1.50
550 Murdock	1.00
R300 DeForest	1.60
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230 Wireless Shop Panel Mtg. .0005	3.80
430 Wireless Shop Panel Mtg. .001	5.25
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1 Chelsea Mtd. .0011	5.00
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Myco D12 175 to 25000 meters Detector 2-step Amp. less Coils and Tubes	165.00
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Every Wireless Experimenter should have a copy of our 200-page catalogue. 35 cents in stamps will bring it to your door, or it will be sent upon the receipt of an order covering \$1.50 purchase.

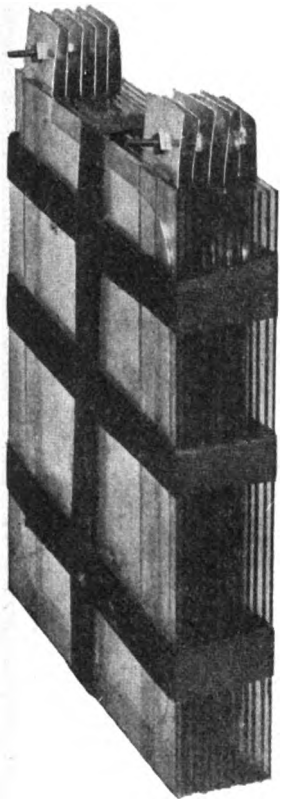
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San Francisco, Cal.

Operating the Fairmont Hotel Radio Station 6XG.
Send for Our Concert Schedule

752 So. Los Angeles St.,
Los Angeles, Cal.

THE "BROWNIE" CONDENSER



An Oil-Immersed Condenser that will increase your radiation—

This is the type of condenser used by 6CH in his long distance work. Will not blow on a full K.W. Absolutely guaranteed to hold up or we will at once return your money. Constructed of a good grade of glass and aluminum plates. Glass insulating separators used. Capacity .006 mf. Container is made of hard oak and is leak-proof. Two large terminal bushings and binding posts, as well as a safety gap, are mounted on top of the case. Large can of castor oil supplied with each condenser. Will increase your radiation considerably. Brush discharge reduced to a bed-rock minimum. If you want to be a "DX" man this season, you must use a reliable condenser.

**PRICE
ONLY \$17.50**

Break-in Keys

Dozens of Break-in-keys were sold last month. Have you heard 'em work on the air? Just listen to the fellow stop sending when someone else "butts in." Send and receive at the same time with this key. It handles 1 K.W. and is the simplest thing in the world to install. Breaks the transformer circuit, shorts the receiving set and shorts the phones,—all in one operation. Press the key and you send. Release the key and you receive. Works on three volts. No aerial switch or key needed if you use this system. No switches to throw—the relay does all. Ask your dealer to show it to you.

\$9.75

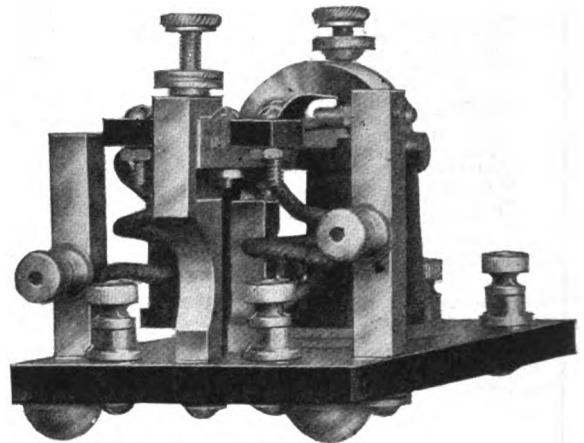
Prepaid to any part of the U. S. Full directions for operating and complete wiring diagram given with each instrument. All orders filled immediately—No delays.

Rheostat and Dial Combined

The latest invention of the Par-kin Mfg. Co. is the new dial-rheostat. Both in one unit. Can be easily mounted on your panel. Has 3-inch dial, brilliant white enamel engraving. Off position for the rheostat. 360 degree rotation. Brass bearings. Bakelite knob. Rheostat will carry 2 amps. Resistance 5 ohms. Brass parts all nickel plated. The rheostat is secured in a groove under the dial. True running—smooth action. Send for one today. You will be pleased with it. The workmanship and design are perfect. And the price will knock you dead.

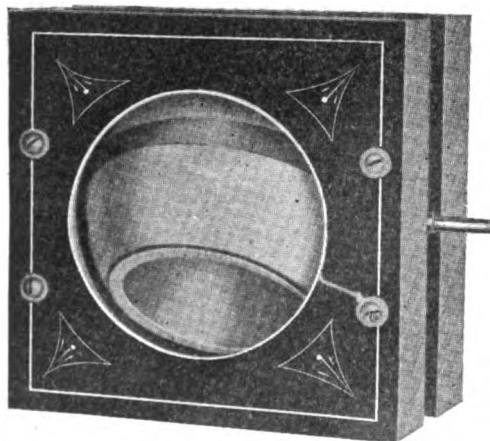


\$1.75 POSTPAID



The peace-maker of the air

**VARIOMETERS \$4.50
VARIOCOUPERS \$3.50 FOR SEPTEMBER**



These instruments are ideal for radio telephone concert reception. A complete regenerative set of two variometers and one variocoupler can be constructed at small cost. Think of it—only \$12.50 for the three of 'em. This special price offer is for the month of September ONLY! All orders must reach us before September 30th. IMMEDIATE DELIVERY—ORDERS SHIPPED ON THE DAY WE RECEIVE THEM. The variometer is constructed of high-grade material and the workmanship is of the best possible. We will refund your money, without question, if these instruments are not all we claim. 25c must be added for postage on each instrument.

**Remember—your order must be in
by Sept. 30th**

Another New One Bakelite Encased Amplifying Transformer

Just out! This new transformer is a dandy. Well made. Enclosed in a BAKELITE CASE—no metal used in the transformer, except the core. Has composition binding posts—another good feature. If it don't work as good as any transformer you have ever tried, send it back to us and we will return your money. Can be mounted in any position. The price is unusually low for a good transformer. Try one of them—a test will mean that you will use them exclusively for your amplifier. Mailing charges 15 cents.

ONLY \$3.75

WESTERN WIRELESS WORKS
5534 EDGERLY ST. OAKLAND CALIF.

The following dealers carry our Break-in-keys:

RADIO TELEPHONE SHOP, SAN FRANCISCO.
BENWOOD CO., ST. LOUIS, MO.
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LEO J. MEYBERG CO., SAN FRANCISCO.
AM. RADIO SALES & SERVICE CO., MANSFIELD, OHIO
MESCO, ST. LOUIS, MO.

C.W. STATION AT BIG CREEK

(Continued From Page 47)

the mining machinery, lighting, etc. It was the constant breaking of this transmission line in winter that resulted in the use of CW for communication purposes.

At Big Creek Radio a relay may be connected with any of the Edison offices, so that the operator in Los Angeles can, if necessary, operate the radio key; this constituting "Distant Control." By connecting the same relay to Western Union lines time signals are daily sent out at noon, for the operators at 60 and 61 to get the "tick." The receiver consists of one DeForest Audion Control Panel, Type P-100, used in connection with two Vernier variable condensers of the same make, Honeycomb Inductances and one Two Step Audion Amplifier, type P-200.

The antenna in the case of the three stations utilizes 150 foot pine trees (with branches partly stripped off) for masts, suspending 5 wires (T type) 200 feet long and approximately 140 foot high. These stations have "Limited Commercial" licenses and are authorized to communicate only the company business. Two operators are employed at each station, but a continuous watch is not maintained.

It might be interesting to note that the International Morse Code is used exclusively on the Edison system, both radio and wire. For the latter a tone wheel is employed to give a musical hum to the signals on the wire. Telephone receivers are used.

These CW stations are delivering the "goods," as they are handling (each station daily) an average of 2,000 words, not including about 1,000 words of press matter for the benefit of the employees.

MEYBERG PHONE HEARD 1600 MILES

6XG, the radio telephone station of the Leo J. Meyberg Company, was reported QSA at a distance of 1600 miles west of San Francisco by the radio operator of the S. S. "West Hixton."

SPECIAL PROCESS PANELS

OF NATURAL OAK BLACK FINISH. Are Meeting With Wonderful Success. Treated with a special process made by us. Will not Warp or Shrink and is not effected by Temperature changes. Waterproof and possesses High Dielectric properties. Easily machined and will not Crack or BREAK.

Looks much better on your set than Formica or Bakelite and costs considerable less.

We are prepared to ship promptly and without delay the following standard sizes.

5x.5x1/4"thick \$.35	6x12x1/4"thick \$.95
6x 6x1/4"thick. .50	9x12x1/4"thick. 1.10
6x 8x1/4"thick. .60	12x12x1/4"thick. 1.50
6x 9x1/4"thick. .70	12x18x1/4"thick. 2.00
6x10x1/4"thick. .80	18x24x1/4"thick. 3.50

Strips 3/2x6, 3/2x8; 3/2x10.....\$.40 each

3/2x12; 3/2x18, \$.60 each. All 1/4" thick.

Add postage for 1 lb. for Panels up to 12x12x1/4". Larger sizes sent by express.

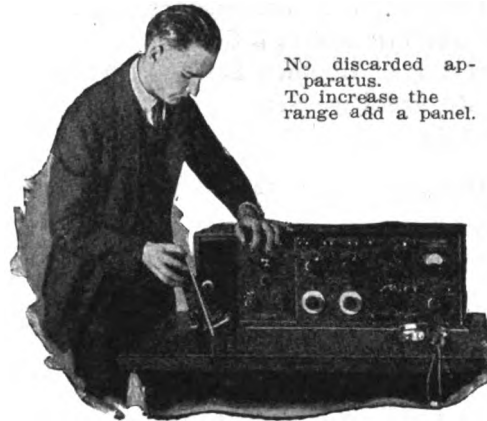
We will be pleased to quote prices on these panels cut to a different size on receipt of your specifications.

We also carry Tensco C.W. Inductance, Unmounted, \$4.50.

In purchasing your Panels and Radio equipment of us of which we have all standard makes and our prices are the same as advertised we will mount it on any of the above panels you purchase according to your specifications FREE OF CHARGE.

Progressive dealers stock these panels.
TENSO MFG. CO. Marshall, Minn.

Specializing in the construction of Radio sets to your specifications.

If It's a **RADIOPHONE***It's a DEFOREST Invention*Get the "Interpanel" Idea
—It's Cheaper in the End

Besides—it's more efficient—in fact, the most efficient system of wireless made.

The DeForest "Interpanel Radiophone System is built on the unit idea, like a sectional bookcase. To lengthen your range, you merely add another unit.

Each panel is surprisingly small and compact, and a four-panel station occupies but relatively little space (see illustration at left).

The "Interpanel" System is for both amateur and commercial CW telephone and telegraph radio stations.

It is the only system that absolutely assures full efficiency in CW transmission.

Before deciding on your wireless outfit, carefully investigate the De Forest "Interpanel."

FOUR PANEL STATION

Complete set of four units, mounted horizontally:

- (1) Complete radio "Midget" transmitter. Phone sending range 30 miles (OT-3).
- (2) Complete short wave tuner, 150 to 600 meters (MT-100).
- (3) Complete audion control, especially for gaseous tubes (MP-100).
- (4) Complete one-step amplifier (MP-200).
- (5) Any additional step of amplification may be added.

Address Dept. 98 for Catalogue

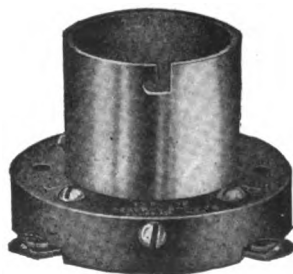
DeForest Radio Tel. & Tel. Co.

1415 Sedgwick Ave., New York City

Pacific Coast Distributors:

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Inventors, Licensors and Manufacturers of Highest Grade Radio Apparatus

PRICE REDUCTION OF TYPE 156
VACUUM TUBE SOCKET

Our universal vacuum tube sockets are now available at the new reduced price. These sockets are adapted to any of the American standard four-prong tubes, receiving or transmitting, old or new style.

POSITIVE CONTACT SPRINGS

RUGGED — ATTRACTIVE — RELIABLE

PRICE \$1.50.

Send for Bulletin 809C.

GENERAL RADIO CO.

Cambridge 39, Mass.

STANDARDIZE ON GENERAL RADIO EQUIPMENT THROUGHOUT

When writing to Advertisers Please mention Pacific Radio News

Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

**Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser,
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others**

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

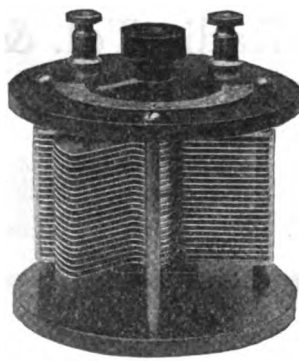
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"ILLINOIS" THE RELIABLE MADE RIGHT - STAYS RIGHT



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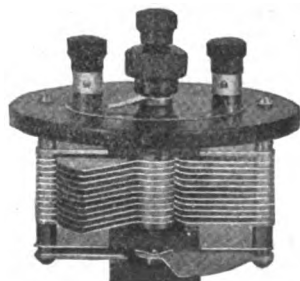


STYLE No. 2.

Three Styles; No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



VERNIER

With Style No. 1, we will, if desired, furnish 3-inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra. We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c. Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave.

Springfield, Illinois

STATIC ELIMINATION

(Continued From Page 67)

cannot be eliminated from an electrical circuit without the proportional elimination of the other.

The elimination of static by treatment of radio wave-decrement, has been tried and failed utterly because of the greater audibility of static on all waves, caused by the more powerful electrical discharges.

The physical difference between radio and static lies mainly in their sounds. There are two kinds of sounds, viz: music and noise. Musical sounds are produced by regular vibrations, and excite a sensation which lasts a perceptible time without noticeable change. Sounds which are produced by irregular vibrations, and which possesses none of the above characteristics are called noises. The steady high-pitched tones of radio transmitters may readily be distinguished as musical. The low, irregular sound of static is classed as noise. An instrument capable of separating these two sounds solves the static interference problem.

It was found, by experiment, that the most complete way of separating composite sounds was by the use of resonators. The writer constructed a form of resonator consisting of two brass half-spheres—a small brass tube projected from the center of one sphere, to which was attached a stethoscope; a watch-case receiver was mounted in the other. These spheres were mounted on a base with their openings facing each other, —the adjustment allowing separation and turning of the spheres.

Very encouraging results were obtained with the watch-case receiver connected to an ordinary regenerative circuit, minus amplification. A point is reached in the adjustment of the resonator where static audibility is considerably reduced, and radio signals can easily be read through it. The static is NOT totally eliminated by this process; its audibility is simply reduced to a point where it ceases to seriously interfere with the reception of radio signals. A microphone was tried in place of the stethoscope with slightly better results.

The operation of the resonator may be explained thusly: In the adjustment of the resonator for loudest radio signals we tune it to the same mode of vibration as the radio-signal tone; thus tuned, it is insensitive to the different static mode of vibration.

Elimination of static by the "sound treatment" method offers much room for development and experimentation. It is hoped that this article will serve as a source of encouragement to experimenters.

Editor's Note: This principle is employed in the "Nostat," perfected by Mr. Arthur H. Lynch.

AUDIOTRONS

Genuine hand-made, two-filament Audiotrons. Excellent Amplifier,

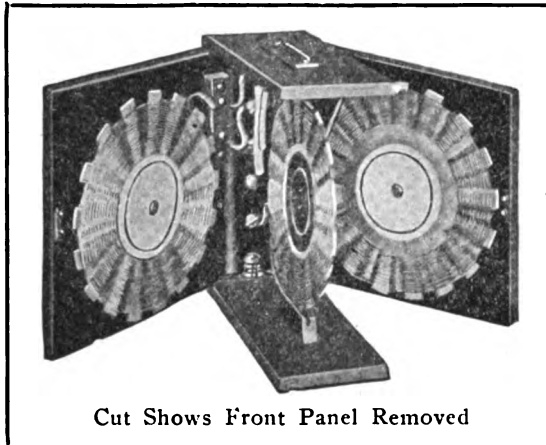
Detector, Oscillator—

\$6.00 postpaid.

Send your order at once and be sure of receiving yours.

EMPIRE RADIO EQUIPMENT Co.
271 West 125th St., New York City

SPIDER WEBS-



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

are now manufactured
on a large enough scale
to have the price

REDUCED TO

lower than originally.. A complete
regenerative set, the equal of any,
for only

\$5.50
Plus 30c
Postage

The New 3000 Meter Set Will Be Out Soon

Distributed Exclusively in the West through

HERROLD LABORATORIES

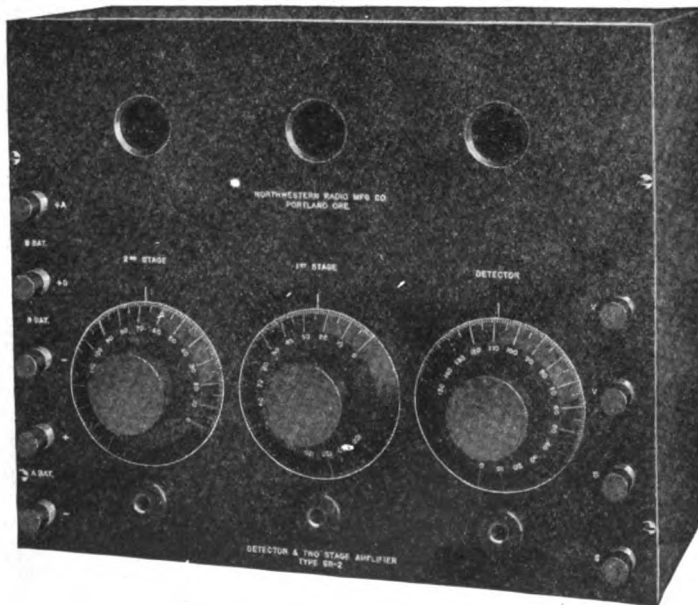
"Everything for the Amateur"

467 SO. FIRST STREET

SAN JOSE, CALIF.

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



Detector and two stage amplifier Type SR-2.
Size of panel 10 1-2x12 3-4. Complete less
tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls, from .005" to .020" thick.

Let us show how our standard products can be made to solve your insulation problems.

Pacific Coast dealers carry a full stock of Bakelite-Dilecto, Vulcanized Fibre, Continental-Bakelite and Conite.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

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CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/2 x 3 1/4	1 1/4	\$5.00
2	.0008 m. f.	Mounted	4 1/4 x 4 1/2 x 2 1/2	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/4	1 1/4	4.25
4	.0006 m. f.	Without Dial	4 1/4 x 3 x 3 1/4	1 1/4	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

One Step RADIO FREQUENCY Amplification

(To Bring Up the Weak Signals)

Then:—

A Supersensitive Detector Tube

(To Detect and Amplify Them)

Then:—

One Step AUDIO FREQUENCY Amplification!

(To Make Them Roar in the Phones!)

This is the **NORTHRAD THREE-TUBE ULTRIFIER**, the most sensitive Detector-Amplifier unit ever developed. Our Laboratory tests were amazing in results

We gladly send complete information to all who are interested. If you want to get results that will astound your radio friends, get on our mail order list. Our customers everywhere are record breakers and record makers, and our prices are right. Our CW Catalogue is now ready for distribution. Send for your copy.

NORTHERN RADIO COMPANY

418 UNION ST., SEATTLE, WASH.

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Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

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"LEARN THE CODE, THE EASIEST WAY. Key and buzzer practice sets with lever key code and instructions. Price \$1.75 postpaid. Hytone adjustable buzzers 60c. Ajax Electric Co., 8 Palmer St., Cambridge 38 Mass."

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\$3 brings you a Roller-Smith panel type hot-wire Ammeter, new, tested and in perfect condition. Regular price \$13. Range, 0-2.5 Amp. Ideal for small C. W. transmitters. Unusual opportunity. Send prepaid or parcel post, C. O. D., for \$3. Better act today, as the quantity is limited. C. J. GOETTE, 2JU, 1624 Hamilton Ave., Woodhaven, N. Y.

UNIT RECEIVING INDUCTANCES assure satisfactory, efficient and unparalleled long-distance reception of all forms of radio transmission. For long wave work our BILATTICE COILS (duo-lateral) need no introduction. For short wave reception a set of SINGLE LAYER COILS compares favorably with the best regeneratives; and the cost is but a fraction of the regular regenerative receiver. Send 3c for bulletin. Our prices and service will surprise you. P. J. Stockwell, Box 157-D, Reading, Massachusetts.

PUT YOUR STATION IN THE DX CLASS. Use a real synchronous gap. We can also furnish you with a Oscillation Transformer to match. Write for particulars and photographs. Let us quote you on parts for your CW set. Radio Supply and Mfg. Co. 23 Merriam Place, St. Paul, Minn.

CABINETS: Quartered Oak and Mahogany Cabinets made to your specifications. Finished or unfinished. Only the best material, workmanship and design used. Our cabinets contain no nails. Radio Telephone Shop, 175 Steuart St., San Francisco.

YOU should have a copy of Lieut. E. W. Stone's "Elements of Radio-telegraphy," 400 pages of data on all sorts of radio equipment. A valuable book. The price is only \$2.50 per copy, postpaid. Pacific Radio Pub. Co., San Francisco, Cal.

ARC RADIO MANUALS, compiled by the Federal Telegraph engineers of San Francisco. Tells you all you need to know about the 2 and 5 KW arc sets for ship and shore use. Send to any address for \$2.50 per copy, postpaid. Pacific Radio Pub. Co., San Francisco.

HOME MADE RECEIVING SET COMPLETE. Large bakelite panel and ase with rheostat and switches. Double filament tube. Eveready Storage Battery and Franco B Battery. Mica Grid Condenser and Fixed Condenser. Three large Murdock Variable Condensers with oil case. Twelve Honeycomb coils on plugs. Two Honeycomb coil adapters. This entire set for \$40. Mesco radio buzzer, \$1.50; Mesco Key, \$1.50; Federal Amplifying Transformer, \$5; Porcelain Base Rheostat, 50c; DeForest Tube, never used, \$4.50; General Radio Base, \$1.25; Common Base, 40c; two Spark Coils, \$1 each; three Western Radio Unit Loads in case, Seven Point Switch, \$1.25 each. Everything for \$55. Martyn Cooney, 475 30th St., San Francisco, Cal.

A CLERGYMAN, wishing to dispose of his wireless outfit, offers some attractive bargains, viz: Remler panel, complete with bulb and B battery, \$10.00; Paragon V.T. control, with B battery, \$6.00; Universal receiving transformer, 2500 meters, \$8.00; France battery charger, with ammeter, \$10.00, and many others. For particulars address "PRESBYTER," this office.

A AIR HOG**By Squawk McGuff**

I have been wondering all along
 Just when I'm doing right or wrong.
 Am I ever going to get in good
 With this fighting amateur brotherhood?
 If you have your set tuned to the minute,
 And you give her all you can get in it;
 Cut through static, rain, wind and fog
 You go in the class of a air hog.
 So often do I hear this phrase
 That I never heard in bygone days.
 They say I make considerable noise
 And get the goat of all the boys.
 In the good old days of nineteen ten
 You could always talk, no matter when,
 But now-a-days there's too many in
 It takes some spark to get thru the din.
 How about the fellow who doesn't use N. A.?
 Gets his party, then don't know what to
 say

PORTLAND AMATEURS

VISIT THE

**RETAIL STORE**

622 WORCESTER BLDG.

PORTLAND, ORE.

COMPARE OUR PRICES

Call or write for Price List. Reliable
 Mail Service

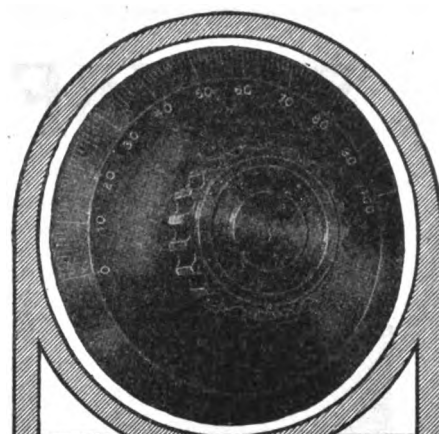
Except "73" o.m. how do you get me?
 I am just wondering, what is he?
 How about the guy that sits on his key
 Just to take his spite on somebody.
 And is always reporting to satisfy a whim
 Ah, I am wondering, what do you call him!
 How about the pest with a glass arm?
 Makes a noise like a Frisco fire alarm!
 Who continually motions to close so and so
 Does he hook up with principles of radio?

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 journal.

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It is not particularly to Corwin's credit that Corwin Dials are the best on the market. With their experience and volume of sales, it would be to their shame if Corwin Dials were any less Perfect.

3" Dial, 75c—with knob, \$1.30

3 3/4" Dial, \$1.00—with knob, \$1.70

At all Radisco agencies,
 and other reliable dealers,
 or sent postpaid anywhere

A. H. CORWIN & CO.

4 West Park St., Newark, N. J.

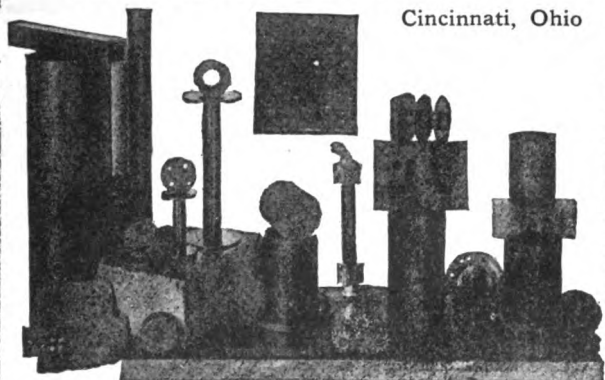
FORMICA**SHEETS - TUBES - RODS****Made from Anhydrous Redmanol Resins**

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:
 Hermans-Griffith Co., Sheldon Bldg., San Francisco
 Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco;
 Wireless Shop, 511 W. Washington St., Los Angeles;
 Northwest Radio Service Co., Seattle, Washington.

An Important Message to the Radio Public!**The Largest "B-Known"**

The sealing compound permeates the entire unit. The unit weighs 12 pounds. The cells are 4" long by 1 1/2" in diameter. The action is QUIET. The capacity is 6400 milliamperes hours. On shelf life the Unit is guaranteed not to depreciate more than 10 per cent in voltage in 6 months.

IF YOUR DEALER CANNOT SUPPLY YOU,
 ORDER DIRECT.

SHIP OWNERS RADIO SERVICE, Inc.

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 Philadelphia, 201 Parkway Bldg. National Ins. Bldg.
 *BALTIMORE, 407 LOBE BLDG.
 *NORFOLK, 26 HADDINGTON BLDG.
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*A complete line of Amateur Apparatus is carried at these Offices

Our Branch Managers will be pleased to give you expert advice on your Radio problems.

SATISFACTION!



That's what the STANDARD VT BATTERY is built to give. But to get it you must insist on the genuine STANDARD VT BATTERY, without modification of the name. Refuse and return the substitute.

Type	List Price
No. 7623—Small size	\$1.50
No. 7625—Large size	2.65
No. 7650—Large size Plub— Variable	3.50

Does Your Dealer Sell the Real Standard VT Battery?

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PACIFIC RADIO SCHOOL

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Read about what's going on among the Commercial, Navy and Army operators

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—RADIO INSTITUTE— OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA
Phone Douglas 3030 331 New Call Bldg., San Francisco

THE ANSWER TO THE BALLOON MYSTERY

(Continued From Page 51)

Only one man has the correct answer. He is 6AS—and he happens to be Brownie's brother. Step forward, please, 6AS, and collect your debt from us. Almost everybody knows that many years ago 6CH gambled with death and eternity in the performance of his duties of a "Balloon Daredevil." He has told you this story on the air many times and his radio shack is decorated with several photographs of the "Balloon Man." Many a time you have seen him hanging to the parachute ring with only the help of his toes. And, after all that he has told you, the many replies that we get to the question deal with nothing but "wind." So here's the answer:

"The relation of Brownie to the balloon, or vice versa, is that 'the air is their hang-out.'"

ERRATA

On page 15 of the August issue there appeared an article by Mr. Frank E. Summers, entitled "Interrupters in Vacuum for Modulation in Transmission and Reception." The word DIELECTRIC is frequently used and the attention of our readers is called to the fact that this word should read DIAMAGNETIC throughout the article.

Don't forget to read the Classified Ads on Page 74.

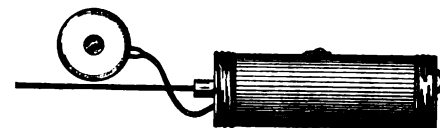
SKINDERVIKEN TRANSMITTER BUTTON



This famous button made in several styles for experimenters and wireless men. Super-sensitive style for detectaphone work. Sends piano, violin and victrola music thruout the house. Common battery style for wireless telephone and amplifier use. Capable of passing a greater amperage than most transmitters. Price with complete instructions for use, \$1.00.

plete instructions for use, \$1.00.

The Wonderful Mechanical Stethoscope



enables you to detect instantly any knock, loose parts or other trouble which causes destruction and heavy expense, unless attended to at once. Auto Mechanics everywhere depend upon the Stethoscope for inside information. The mechanical Stethoscope with authoritative Sound Chart offered to you on a money-back guarantee for only

\$7.50 by mail, postpaid.

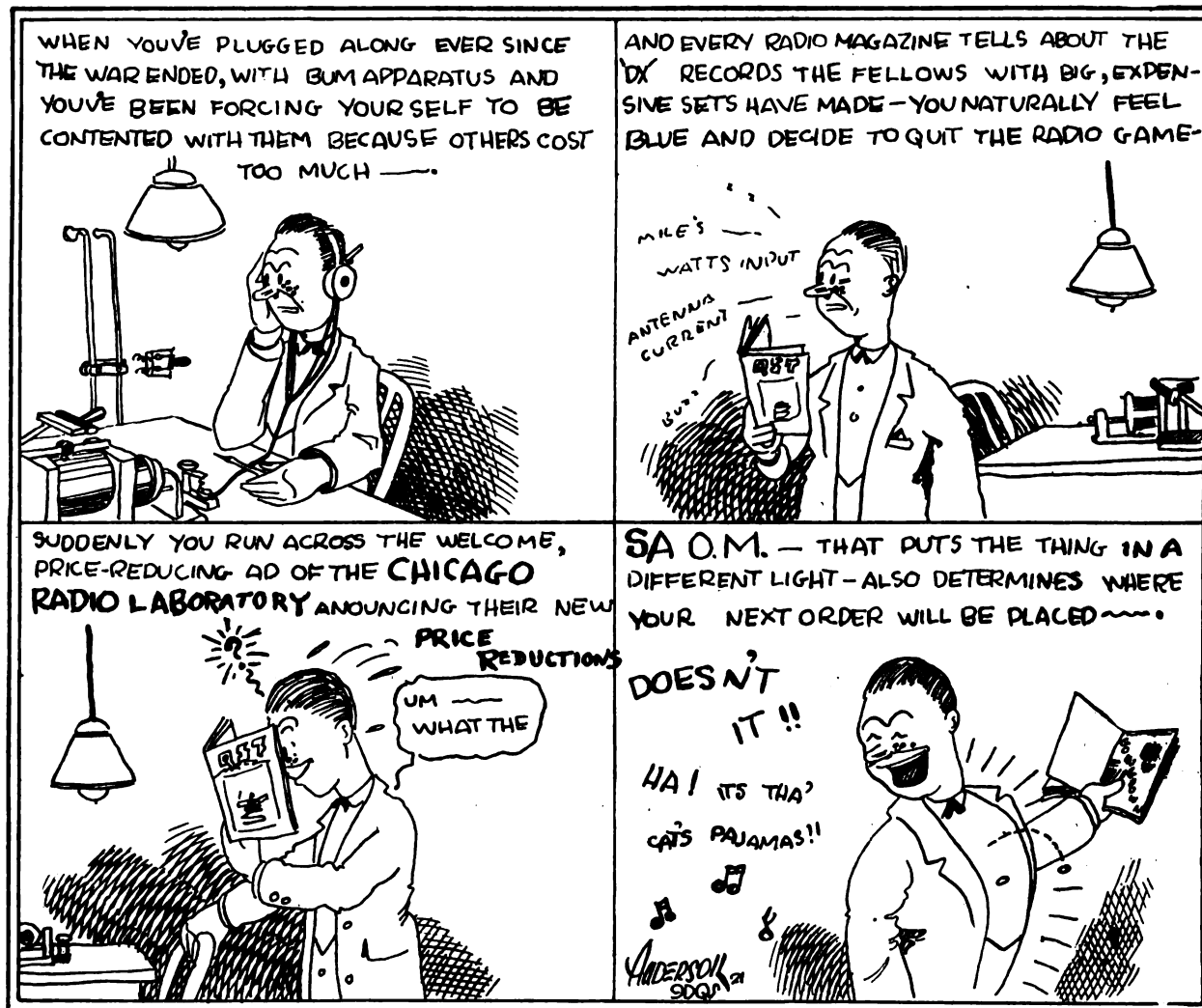
Send for literature and letters of approval without obligation.

EXPERT TESTIMONY

"IN my 18 years of using broom handles, screw drivers and other handy things to locate sounds with, I have never had anything that could beat the Stethoscope. If I could not get another, \$100.00 would not buy mine." (From an automobile expert, name on request)

General Sound Transmission Corporation
114 LIBERTY ST., NEW YORK.
Dealers and Agents Wanted. Write for Literature.

Don't Feel Blue—Let the Tubes on your C. W. Set do that!



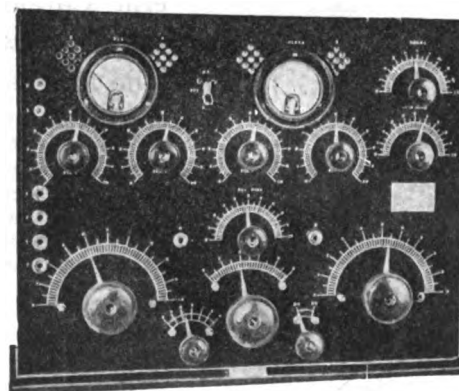
"OUR LATEST"

"Z-NITH" RADIO APPARATUS

Has Been Reduced in Price Approximately
15 Per Cent on Each Instrument.

These prices represent
our contribution to-
ward the reduction of
the "High Cost of
Radio."

Instrument	Old Price	New Price
Z-Nith Regenerator	\$ 65.00	\$ 55.00
Amplifigon AGN-1	75.00	64.00
Amplifigon AGN-2	105.00	89.25
Amplifigon AGN-3	135.00	115.00
Hyrad Disc	12.00	10.50
Hyrad Non-Syn. Gap	65.00	49.00
Hyrad Syn. Gap	125.00	105.00
Jeweler's Time Rec.	75.00	69.50
Multiceiver MC-3	265.00	236.00
Altaceiver CW-3	300.00	254.00
C. R. L. Regenerette	12.75	12.75
One-Step Amp. AM-1	33.50	28.50
Two-Step Amp. AM-2	65.00	55.00
Detector AD	20.00	17.00
Detector ADP	30.00	25.00



Z-NITH MULTICEIVER MC-3

The most complete, ef-
ficient and flexible re-
ceiver ever designed.
Described in detail in
our Catalog F-21.
Write for it.

CHICAGO RADIO LABORATORY

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Testing Station 9ZN—5525 Sheridan Road

CHICAGO, ILLINOIS

RADIO APPARATUS
For
Amateur and Experimental Use
With
INSTRUCTIONS IN CONTINUOUS WAVE OPERATIONS



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of America

Sales Division, Woolworth Building, New York City

C.W. INSTRUCTION

The most needed book of the hour

The Radio Corporation of America takes pleasure in announcing the publication of its new combination C. W. Instruction Book and General Catalogue of experimental radio accessories.

The first section covers:

- A. The Use of Radiotrons in C. W. Work.
- B. General Operating Instructions for Tube Sets.
- C. Nine Practical C. W. Radio Telegraph and Telephone Circuits and their Constants.
- D. Precautions in Using Transmitting Tubes.
- E. Radiotron Power Tubes.
- F. Kenotron Rectification.

The second section consists of a catalogue embracing a complete

line of radio telegraph and telephone apparatus for amateur and experimental use.

The first edition of this important book is limited. In order to insure *your* copy, sign the coupon on this page and return it to us promptly. Copies will be ready for distribution September 1, which will give you ample time to prepare for fall and winter C. W. experiments.

DEALERS:

You will need copies of this book and you will want to handle the new line of R. C. products. *Prepare for the fall trade.* Write direct to:

Radio Corporation
of America

Sales Division, Commercial Department, Suite 1804
 233 Broadway, New York City

DO IT TODAY
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 Radio Corporation of America
 Woolworth Building, New York City
 Gentlemen: Enclosed please find 25c in stamps, for which place me on the first mailing list to receive the new catalogue on C. W. transmission and radio apparatus. Delivery on or about September 1, 1921.

Name.....
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CONTEMPLATED DISTRIBUTION OF RADIO MARKET NEWS

Continued from page 68

Marketing Bureau of Missouri is looking forward to encouraging the installation of inexpensive radiophone equipment in thousands of farm homes throughout Missouri.

If this ambitious program is worked out to a success, there will be a new version in Missouri of the old poem entitled "Why Boys Leave the Farm." In addition to receiving valuable market information on wheat, live stock, cotton, fruits and vegetables and other farm products farmer boys and girls in Missouri will be able to sit in their homes and entertain their friends by listening to a concert given by the Minneapolis Symphony Orchestra at Minneapolis, or to Galli-Curci in Chicago or New York. Hundreds of other events of intense interest are witnessed daily by boys all over the United States who have installed radio outfits at their homes.

Alfred Tennyson in his poem entitled "Locksley Hall," written in 1842, said:

"For I dilt into the future, far as human
eye could see
Saw the Vision of the world, and all the
wonders that would be;

"Saw the heavens fill with commerce,
argosies of magic sails,
Pilots of the purple twilight, dropping
down with costly bales;

"Heard the heavens fill with shouting, and
there rain'd a ghastly dew
From the nation's airy navies grappling in
the central blue;

"Till the war-drum throb'd no longer, and
the battle-flags were fur'd,
In the Parliament of man, the Federation
of the World."

Truly, it does not seem to be such a "dip" into the future as far as Tennyson prophesied concerning commerce and naval engagements by air craft to the realization of the wonderful possibilities of the wireless telephone and telegraph. By "dipping into the future" only a few years, however, the Missouri State Board of Agriculture believes that thousands of Missouri citizens may be able to sit in their homes and hear the delegates in the legislative halls at Jefferson City relative to the "farmers' monopoly on food products," the question of "regulating airship traffic," and other important future topics for legislative consideration.

The first really big step in the Missouri program will be a radio exhibit at the Centennial State Fair to be held in Sedalla, August 8-20, 1921. This new idea in connection with a market exhibit at an agricultural state fair will certainly fit into the Centennial program,—Missouri's celebration of her 100th birthday. One does not have to go back into Missouri history or the history of the nation 100 years to make a comparison of the slow means of communication of

former years to that of the wireless telephone as it has been so excellently perfected within recent years. This and other comparisons between modes of travel, communication, and living in Missouri in 1821, when that empire state was admitted into the Union, and 1921, will be made by hundreds of other exhibits at this great mid-western Centennial State Fair.

Doubtless, the radio market news furnished to the farmers attending the Missouri State Fair will remind them that marketing problems in the state in 1821 were quite different from those of today. Most any kind of news in that day in Missouri was more of a curiosity than an every day occurrence or necessity. Certainly market news of any kind for the farmer was unheard of in 1821. If it had been available, the crop of the next season would have been ready for market before the market news concerning the preceding crop could be received.

Who will venture to picture the state of affairs that will exist, not only in agriculture but in every activity of life, when the wheels of evolution shall have brought Missouri farmers back to Sedalla in 2021 to celebrate the state's second anniversary?

After the State Fair has ended commences the circuit of county fairs which last until the middle of October. While it may be impossible to get into each of the 114 counties of that big state, the Missouri Board of Agriculture intends that its State Marketing Bureau shall establish radio connections with many of the county fairs and its offices at the State Capitol at Jefferson City. This work will bring the feasibility of distributing government market news from the offices of the State Marketing Bureau at Jefferson City to the farmers in every county of Missouri in an intensive and practical manner. The installation of many radio outfits to connect the various counties with market news headquarters of the State Mar-

keting Bureau will undoubtedly follow in the wake of this means of demonstrating the practicability of connecting the smaller towns and even the farm homes with the outside world by radiophone.

No let-up in this demonstration work is anticipated by those in charge of the work in Missouri. Connections will be made from time to time between the State Marketing Bureau offices at Jefferson City and various meetings of farmers and farm organizations, such as Farmers' Week, held at Columbia annually, various agricultural conventions held in St. Louis and Kansas City, meetings of Farm Bureaus, Farm Clubs, Granges and Unions.

Both manufacturers and jobbers of radio equipment are taking a keen and active interest in the Missouri program and will assist it by very substantial and effective means. It offers the first opportunity in the history of the radio for the promoters of the science of wireless communication to assist in a big program of showing the people of any state the value of the wireless telephone and telegraph.

Led by the State Marketing Bureau within the borders of their own state, Missourians, the "show you" folks, are going to be "shown" one of the most remarkable advantages offered by modern science. Other states will undoubtedly follow the example set by that great agricultural state.

Arrangements will be made to invite President Harding to speak from Washington to the Missouri State Fair folks during the two weeks' fair. Governor Arthur M. Hyde also will address the Missouri crowds by radiophone several times during the Centennial State Fair. Daily market news will be distributed through the crowds, and radio concerts will be given during the period of the great Centennial State Fair.

The equipment is being furnished by the Benwood Co.



SOMETHING NEW

THE PARKIN DIAL TYPE RHEOSTAT

(Patent Pending)

Consists of a 3-in. molded Bakelite dial, in the back of which is a circular groove containing the resistance element. This groove, being recessed, allows the dial to clear the panel by the usual distance of 1-16 in. An off position is provided, and a stop on the dial engages the stationary contact at the extreme positions. The 360 degree rotation insures fine adjustment. A brass bearing insures a true running dial and smooth action.

All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob.

Resistance is 5 ohms, carrying capacity 2 amps.

No. 77 Parkin Dial Type Rheostat. Postpaid \$1.75

FOR SALE BY ALL LEADING DEALERS

Send for free Catalog No. 4 describing our complete line.

Dealers: Write for proposition.

PARKIN MFG. CO.

SAN RAFAEL, CALIFORNIA

SECOND-HAND STOCK AT UNHEARD-OF PRICES

We have a number of pieces of apparatus left here by our customers for sale. These, as is the custom of TRTS, are fairly priced and are to be sold to the first comer.

- 1 Radio Craft Detector and 2-step amplifier... \$30.00
- 1 PB Detector, and 2-step amplifier, a snap... 45.00
- 1 PB Detector and 2-step amplifier... 55.00
- 1 DeForest Tuner, P200 type, with extra condenser for phones... 40.00
- 1 Magnavox, \$45 type, almost new... 35.00
- 1 Magnavox, \$45 type, first model... 30.00
- 1 Cabinet with 2 DeForest condensers, one .0015 MF with Vernier, other .001 MF... 28.00

(Above has Formica Panel and Oak Cabinet)

THE RADIO TELEPHONE SHOP

- 1 partly complete 4-tube phone set, wired up with 2 DeForest condensers, Acme modulation transformer, inductance, switches, General Radio Buzzer, etc. 45.00
- 2 6-volt 150-ampere hour Edison batteries, just overhauled, A-1 condition, each... 35.00
- 1 pair Stromberg-Carlson phones, good condition... 2.50
- 1 pair Wireless Specialty Adj. Magnet phones... 3.50
- 1 pair Brandes Old Navy Type phones, A-1 condition... 4.00
- 1 0-5 AC Ammeter... 4.75

A number of used Cunningham and Radiotron tubes at \$4.25 each. These tubes have been used very little in demonstrating purposes with shop sets.

175 Steuart Street, San Francisco, Calif.

When writing to Advertisers Please mention Pacific Radio News

Do Amateurs Realize the Wireless Opportunities that Await Them?

How the President of the National Radio Institute Answered this Question when it was Put up to Him. What would You have Said? Is the World's Fastest-Growing Field actually going to slip away from those best able to Cash in Big on it? These are Questions which will Interest Every Radio Amateur.

THAT was one of the questions recently put up to me by a well-known authority visiting Washington. "In your opinion," he said, "do amateurs realize the wireless opportunities that await them?" For a moment I was stunned! Then I replied, "Yes, with just one 'but.' I think that amateurs are well aware of the tremendous expansion of wireless that is daily going on. They realize that it is sweeping the world like wildfire. BUT I do not think that they realize what this means to them—they do not realize that they can easily get the 'plums' that the field offers. They have the 'jump' on everyone else, and they should realize now that

'the fastest-growing field in the world' besides being a fascinating hobby is a wonderful, opportunity-filled field offering splendid present advantages—and growing so rapidly that the future is beyond estimation!"

I wonder if many amateurs have ever considered the fact that what is to them a fascinating hobby is also a fascinating profession, filled with big opportunities that they can easily share whenever they are ready to do so. It's only a short step for them now to a splendid field that they can put their hearts into—and offering a bigger future than older businesses which are overcrowded.

Big Opportunities Are Knocking—Are Some of Us Saying "Please Go 'Away and Let Me Sleep?"

After the caller who started me thinking about this matter had left, I jotted down on my pad some of the items which I had recently noted regarding wireless expansion. On land and on sea big opportunities are opening, and even greater uses for wireless are being found every day. No doubt you, too, have read these items, but I am going to have them printed here because I want to impress upon you what this tremendous expansion can mean to you.

When I read every day how wireless expansion is sweeping over the world I often say to myself, "Big opportunities are knocking—I wonder if amateurs realize that they can cash in big on this growing field. While opportunities knock, I wonder if some aren't saying, 'Please go 'way and let me sleep.'" Of course, they aren't sleeping by any means, but I want all of them to know just how easy it is to fully qualify for a field which is undeniably filled with greater advantages than most others in the world today.

EASY TO QUALIFY IN SPARE TIME—AT HOME

I want to tell you—without obligation to yourself in any way—more about wireless opportunities and how you can take advantage of them. I would like to tell you about our Institute, which is officially recognized by the United States Department of Commerce and whose name heads the list of the schools recommended by the U. S. Shipping Board. This National Radio Institute was the original and is today the oldest and largest school in America teaching wireless by mail. The government allows our graduates five to ten points credit when taking First Grade Government License examinations. We have graduates in almost every part of the world who have quickly qualified through the special method through which we make Wireless amazingly easy for anyone to learn completely at home in spare time.

These are some of the main points about this Institute and I am sorry I haven't room

to tell you all of them. I should like to tell you more about our wonderful new methods of teaching, about our remarkable new invention, the "Natrometer," which each student gets free, and which almost cuts in half the time necessary to learn Wireless thoroughly. Then, too, I'd like to tell you about our free Post-Graduate Course and about "Dots and Dashes," about our Diploma, our Relay League, Employment Service, and about our special easy-payment plan. But there is not enough room here to tell you about all these things so I am going to ask you to write me for a new interesting booklet we have gotten up.

WRITE ME FOR BOOKLET

A little coupon is being put here so that you can save yourself trouble in sending for this illustrated booklet, "Wireless: The Opportunity of Today." By mailing this coupon you will not be obligating yourself in any way and no solicitor will call upon you. But the coupon will bring you some mighty interesting facts about Wireless Opportunities and about how you can quickly and easily qualify for them—at home and in your spare

time. Won't you mail this little coupon at once? Whether you are a junior Radio Amateur and want to learn all about Wireless or whether you are anxious to fully qualify so as to enter the wireless profession now in one of the fine opportunities open on land or on sea—write me for this booklet. All that I ask is that you write as soon as possible. And—since there is no obligation—why not write me today?

P. S.—By the way, we are making a special short-time offer, for a strictly limited time, in which we are giving all new students, our complete new course in Wireless Telephony FREE. Mail the coupon direct to me, today, and let me tell you about it by return mail. Mr. James E. Smith, President, The National Radio Institute, Dept. 299, Washington, D. C.

Residence schools in Washington and Baltimore.

MAIL THIS COUPON TODAY—

Mr. James E. Smith, President,
National Radio Institute,
Dept. 299, Washington, D. C.

Send me your FREE book, "Wireless, The Opportunity of Today." Tell me about your Institute and your special short-time offer.

Name

Age Occupation

Address

City State

☐ I am interested in a sea position.

☐ I am interested in a land position.



Mr. James E. Smith,
President,
National Radio
Institute

What I Jotted Down

Here are the items I jotted down on my pad, showing how Wireless is growing by leaps and bounds all over the world. Let me tell you what this world-wide sweep of wireless expansion means to you and to your future.

A \$20,000,000 American corporation has been formed to establish wireless stations in every part of the globe.

The U. S. Merchant Marine operates over 30,000 vessels. Wireless is now a necessity on ships.

The Chicago Tribune now receives foreign news by wireless. Other papers are calling upon Wireless too.

Huge wireless stations are springing up all over the world. Saint Assise, France; Bordeaux, Ville Juif, and Lyons, France; Peking, China; Geneva, Switzerland; Shanghai, China; Fiji Islands; Warsaw, Poland—and these are but a few.

Many railroads are calling upon wireless to dispatch trains and carry on communication. The Lackawanna, The Louisville & Nashville, The Canadian Pacific, The Nashville, Chattanooga & St. Louis, are some of them.—New York, Cleveland, Chicago and Detroit are connected by an inter-city wireless service.

Criminals are being intercepted by wireless through the Police Department of New York, Dallas, Chicago, and other cities.

Brokers, Bankers, Merchants, Manufacturers and other business concerns are calling upon wireless. John Wanamaker, Goodyear Rubber Co., Standard Oil Co., New York Stock Exchange, are only a few.

Farmers are getting Market and Weather reports daily by wireless in all sections of the country.

New wireless stations are springing up in every part of America. Belfast, Maine; Cape May, N. J.; East Pittsburgh, Pa.; San Francisco, Cal.; Helena, Montana; Seattle, Washington; Mobile, Alabama—these are but a few.

The Aerial Mail Service of the Post Office Department already has 12 radio stations in operation.

The Japanese are constructing a powerful station in the Orient.

A big new wireless service is being established between England and France.

The Federal Telegraph Co. is establishing a complete chain of stations on the Pacific Coast.

Messages are sent from the Philippine Islands to Washington (10,000 miles) in 3 minutes.

Daily wireless service between the United States and Japan is in full operation.—St. Johns, Newfoundland, is operating a large service.

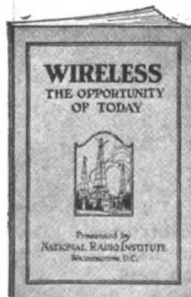
Danzig, in Europe, is carrying on large wireless operations.

Three tremendous stations are operating on Long Island at Easthampton, Port Jefferson, and East Moriches.

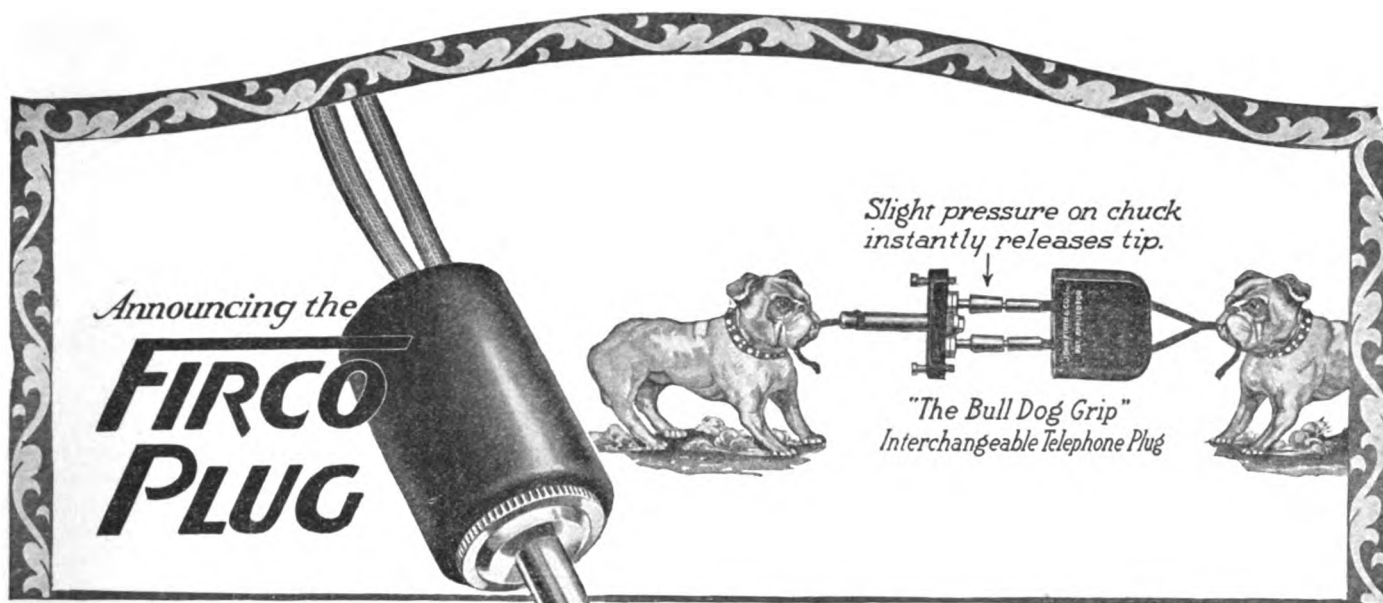
South America is planning to establish a chain of stations at Rio de Janeiro, Asuncion, Buenos Aires and Montevideo.

One single American concern offers wireless communication between the United States and France, England, Germany, Norway, Denmark, Sweden, Finland, Poland, Honolulu and Japan.

And these are only a few of the examples showing how Wireless expansion is spreading over the whole earth. It brings you amazing opportunities—and you can now easily grasp them.



When writing to Advertisers Please mention Pacific Radio News



Announcing the **FIRCO PLUG**

PRICES

FIRCO PLUG

(Patent applied for)

No. 34A, Flat type.....\$2.00
No. 34B, Round type... 2.50

VOCALOUD

Station type\$30.00
(In solid mahogany cabinet)

Laboratory type\$25.00
(Mounted on adjustable metal base)

SACO-CLADS\$5.00
(In individual cartons)

Grips like a Bull Dog

Press the chucks outward, insert any standard telephone cord tip, and then,—“The harder you pull, the tighter it grips.” The same slight pressure instantly releases the tips, so that you can use the plug for another instrument.

You can change from one pair of tips to another in less than 10 seconds. No forcing, no filing, no soldering.

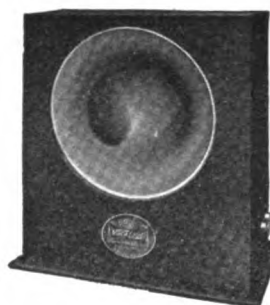
The “Bull-Dog-Grip” makes a perfect electrical connection. Other exclusive Firco improvements reduce the capacity effect and dielectric loss to a minimum.

The Firco Radio Plug is provided in two styles, flat, and a new round type, similar to the U. S. Signal Corps standard.

With the round type, all that is necessary to get at the chucks is a few turns of the outer insulating sleeve. No screws to remove, no tools needed.

The flat type is made small and compact for use in small space and corners. A few turns of a screw driver releases the insulating sleeve.

Bring your station up-to-date. Use plugs and jacks thruout. Insist on Firco Plugs in individual cartons from your radio dealer. They fit all standard jacks and cost no more than other plugs without these exclusive improvements.



VOCALOUD

This clear-toned loud speaker is proving the sensation of 1921 radio. No batteries, no adjustments, no extra equipment. Just hook a Vocaloud in and get your signals QSA—all over your house.

SACO-CLADS

The 100% shielded amplifying transformer. No magnetic leakage and no howling. Six steps are entirely practical without howling or squealing. Provides the correct ratio of impedance for modern VTs.



Patent applied for

If there is any Firco product your dealer does not carry, send two cents for illustrated leaflet. Ask your radio dealer to show you the new Firco loose-leaf catalogue. Mailed direct for 25 cents.

John Firth & Company, Inc., 18 Broadway, New York



FIRCO Audion Detectors and Amplifiers
Radio Frequency Amplifiers
High Voltage Units
(any primary voltage)
Baldwin Phones
FIRCO Vocaloud
Saco-Clad Transformer
FIRCO Plug & Accessories
Navy Standard
Leyden Jars
Kolster Decremeter
Eldredge Meters
Brownlie Phones
Seibt Scientific Instruments

FIRCO RADIO

EQUIPMENT

“Pioneers—since 1901”

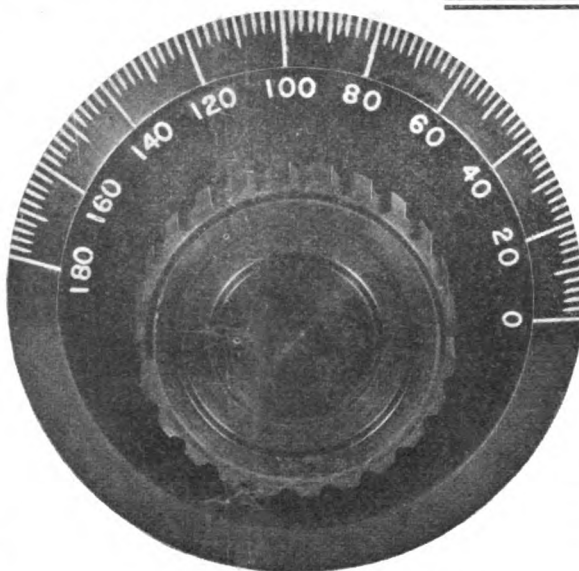
Introducing THE PEN BRAND DIAL

A three inch CONDENSITE DIAL

(Unbreakable)
with a large

DeForest Knob

3-in. diameter - \$1.30
4-in. diameter - 1.75



At Last

A dial with a REAL knob. This dial is, without doubt, the prettiest instrument of its kind that has yet appeared on the market. It affords the user a very close adjustment on condensers or variometers on account of its generous sized knob. It fits harmoniously with the knobs used on DeForest instruments. This instrument is made of CONDENSITE and is indestructible. And it is lined straight. Specify PEN BRAND dials on the set you are constructing.

3-in. diameter. Price...\$1.30
4-in. diameter. Price... 1.75

FORMICA PANELS

3-16th thick. 2½¢ per square inch.

Cut to **exact** sizes, with edges smoothed off. To find the exact cost of a Formica Panel (3-16th thick) multiply the height by the length to get the square inches, and multiply the square inches by .02 1-4, which gives the exact price of the panel in dollars and cents.

For polishing panels to a high gloss finish, add 75¢ per square foot. 75¢ minimum charge.

Marking out panels for drilling, \$2.00 per hour.

For drilling panels bought from us, we charge \$1.00 when panel is "center-punched."

CABINETS

made to your specifications. Quartered oak or mahogany, finished or unfinished. Hinged top cabinets cost but a few cents more. Come in and see the ones we offer. They are the best obtainable.

NEW—B BATTERIES

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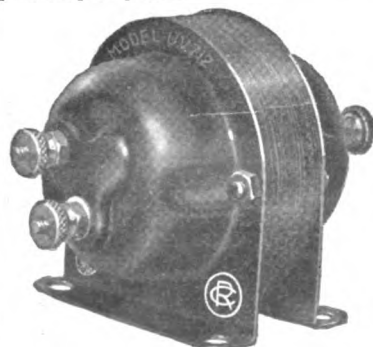
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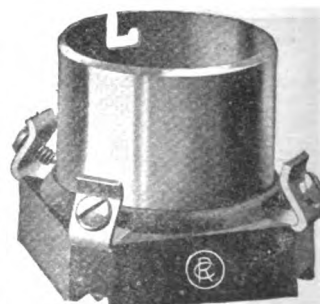


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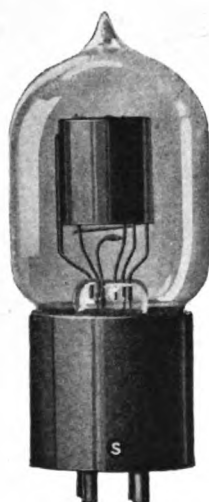
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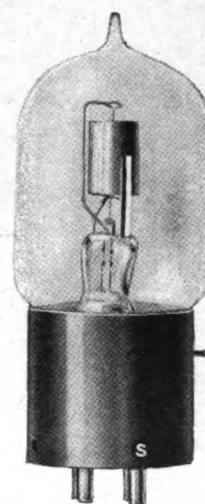
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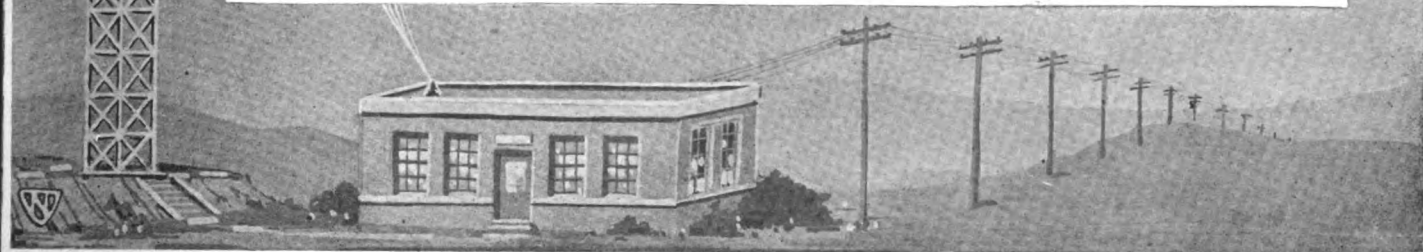
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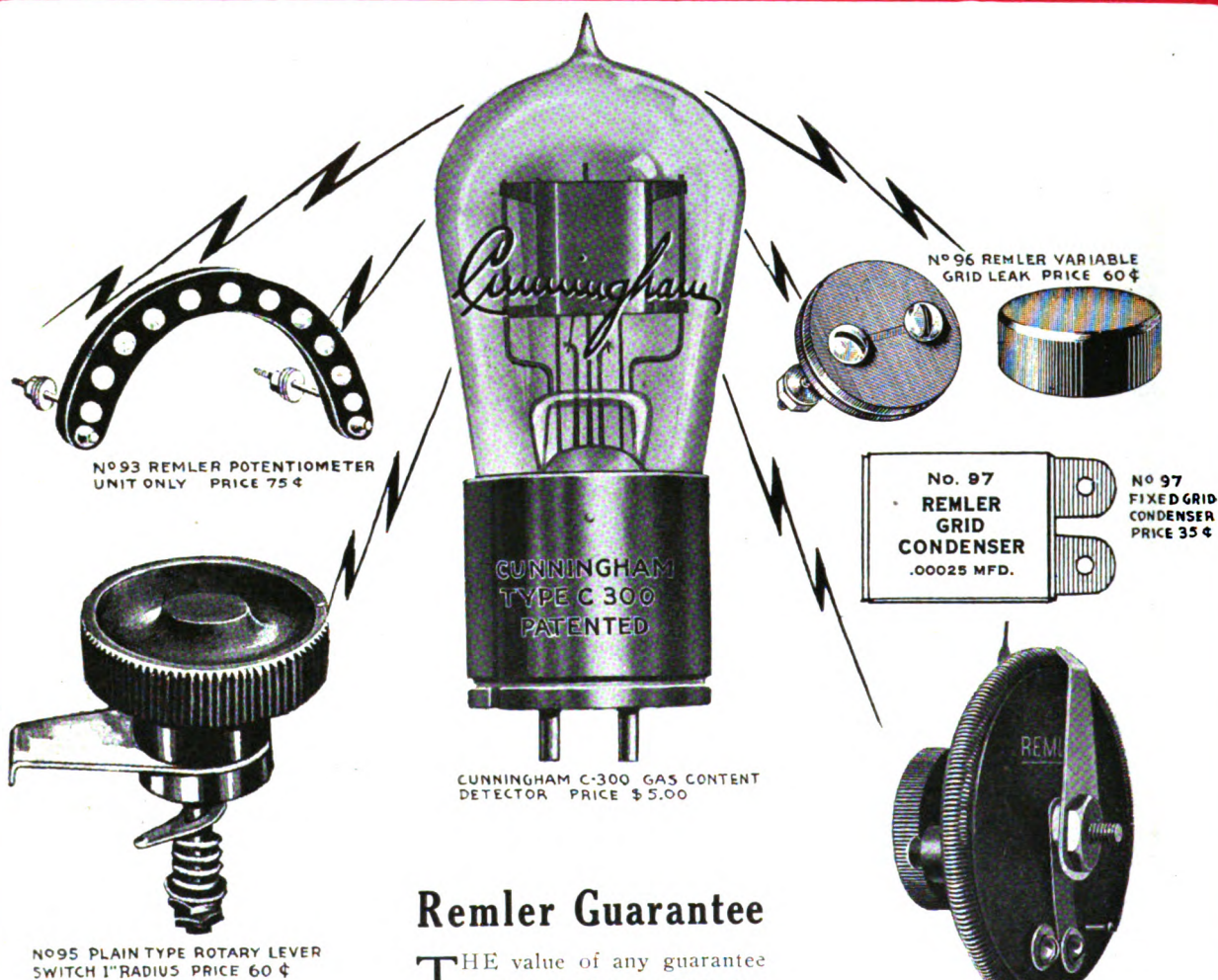
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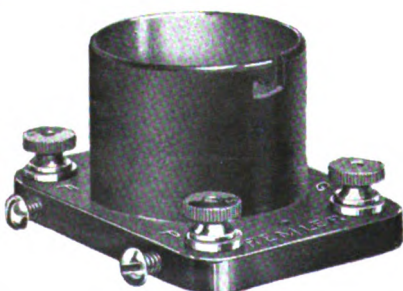


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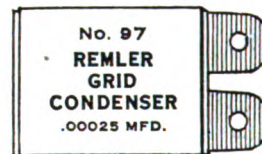
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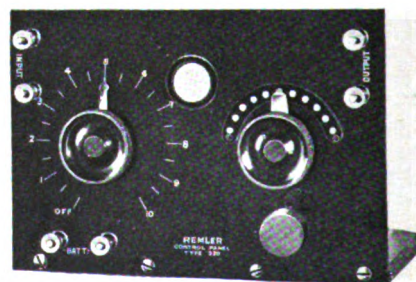
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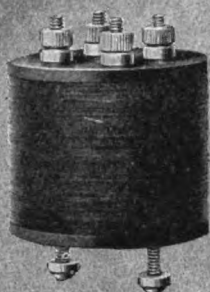
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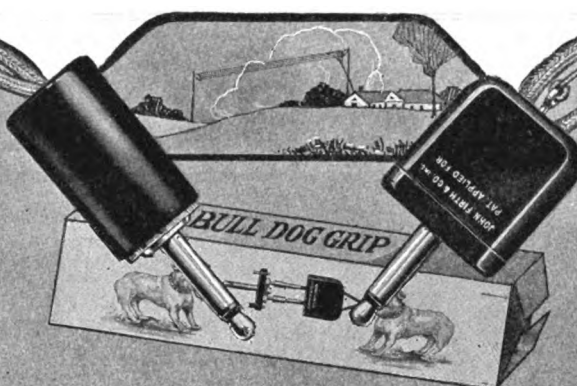
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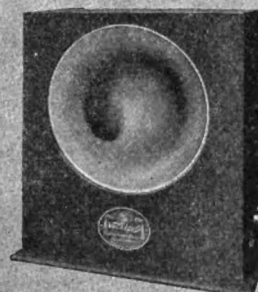
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HERE might be a full page ad devoted to every instrument on this page. But the actual apparatus is far more convincing than anything we could say. So we simply refer you to your dealer. He has our elaborate loose-leaf catalogue, and will gladly obtain any instrument you ask for. In fairness to yourself, insist on examining Firco instruments before you buy.

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THESE NEW FIRCO RADIO INSTRUMENTS are typical of the quality of apparatus which we have been supplying to the Government departments for many years—yet the prices are unusually low.

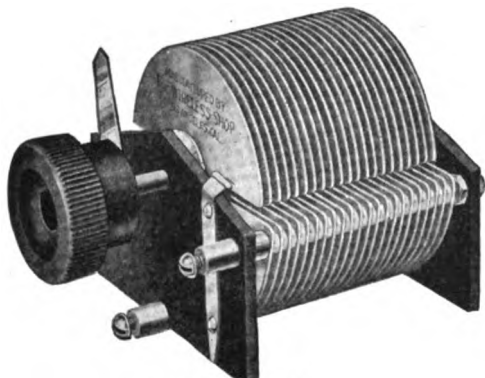
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John Firth.

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Which are You interested in?



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WOULD YOU RATHER TAKE AN INFERIOR INSTRUMENT AND SAVE A FEW CENTS—OR—PAY A LITTLE MORE AND GET THE BEST?

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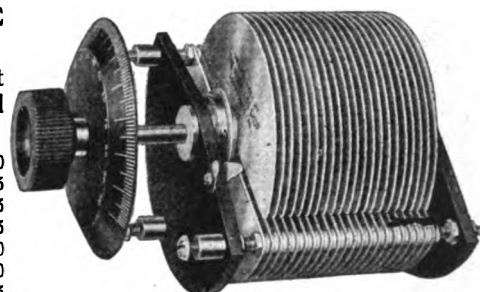
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No. 70	7 plate, approximately .0001 m. f. maximum capacity 2.35
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IF YOU REQUIRE A HEAVIER MODEL THAN THE "SERIES T"—OUR "SERIES L" WILL FILL THE BILL. Larger plates and heavier construction throughout. Supplied with knob and pointer and mounting screws, brass or nickel.

PRICES

No. 2300	23 plate, approximately .00075 m. f. maximum capacity	.....\$ 6.00
No. 4300	43 plate, approximately .0013 m. f. maximum capacity	..... 8.00
No. 6300	63 plate, approximately .002 m. f. maximum capacity	..... 10.00

Include postage for two pounds on No. 2300 condenser and for three pounds on No. 4300 and No. 6300, and insurance, to your postal zone.

AND—OUR SERIES "CW" IS THE ONLY REAL CONDENSER FOR YOUR PHONE OR "CW" SET.

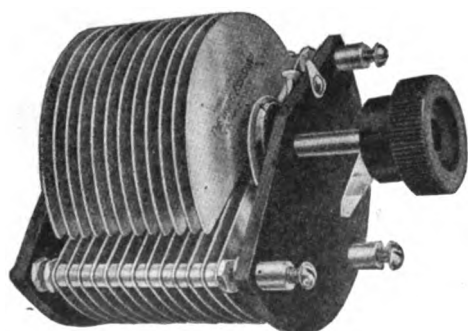
The plates are amply spaced to prevent spark-over on high plate potentials, and the construction is extremely rigid. With knob and pointer and mounting screws, the prices are:

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Editor

LAWRENCE MOTT
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Nov. Issue forms
close on Oct. 1st.



PACIFIC RADIO NEWS

RADIOTORIAL

By the Editor

PUBLISHED MONTHLY

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Pacific Radio Pub. Co.

Wherein the New Editor Introduces Himself

AT his first appearance before the reading public he is to serve, an editor is expected to drop the mantle of his multiple personality so as to draw a pen picture of himself and to outline his editorial policy. Thereafter "never again" on the tall, vertical pronoun.

So I, Arthur H. Halloran, being duly sworn, do depose and say that I am a Westerner by birth, an engineer by profession, a publisher by vocation and a radio enthusiast by avocation. As a boy I learned to set type, was editor of two amateur papers, and was manager and editor in turn of an engineering magazine at the University of California. Then I was with the Mining and Scientific Press for three years as associate editor and as advertising manager, with the Journal of Electricity for ten years as managing editor and have just ceased to act as Pacific Coast representative of the McGraw-Hill Book Co. I am young enough to play with my own two boys and old enough to enjoy a heavy reputation as a scientific high-brow. Furthermore, I have been actively identified with several electrical associations.

My intention as editor is to carry on the good work that has already been started in these columns, with the hope of making each issue bigger, better, and brighter than the one before. New features and new departments are to be added. The needs of the beginner, as well as those of the more advanced worker, are ever to be kept in mind. The enlarged scope of the paper will be made evident by the new name RADIO, which will greet you on the cover of the next issue. Yet all of the old features that have endeared P. R. N. to the hearts of its readers will be retained. Especial attention is to be paid to C.W. work under the direction of Mr. Lawrence Mott, who will continue his writings as associate editor.

You and I are young in the world of radio, which opens up a vast new continent for discovery and development. Radio communication is making the



Arthur H. Halloran,
Editor of "Pacific Radio
News"

world, and mayhap the universe, smaller. Maxim predicts wireless transmission of power. Marconi believes that he has intercepted messages from Mars. The man who says that something is impossible is interrupted by some one doing it. Every day witnesses new applications of the hitherto dark octaves of etherial vibrations. Yesterday's dreams are today's experiments and tomorrow's actualities. There is always something new and interesting to learn in radio, and it is my function as editor to help you in so doing.

But this can be done satisfactorily only by your letting me know what kind of articles you would like to read and by your submitting news about your work for publication. When you solve some knotty problem, when you hear some interesting bits of news, or when you learn of something that will help your fellow worker in the radio field, send it along so that it may be printed. "Your light is none the less for having lit that of your neighbor"; your magnet is none the weaker for having magnetized his; your radiations are none the less powerful for being picked up by some distant amateur.

Also let me know what is your big problem, what there is about radio that you do not understand, and what kind of articles you prefer to read. Your criticism or praise, your questions or needs, will be my guide in trying to give you the kind of a paper you want to read. An editor is not a mind-reader but must depend upon constant expressions of opinion from his readers in order to help them and hold their interest. It is really the readers that make a paper. You can help to make RADIO the foremost paper in its field. The more you help the better you will be served.

Therefore let it be our slogan—yours and mine—
"All together, all the time, for everything in radio."

ARTHUR H. HALLORAN.

(Radiotorial Continued on Next Page.)

RADIO PATRIOTISM AND PREPAREDNESS

By Lawrence Mott, Associate Editor

IT was the immortal Theodore Roosevelt who cried: "Preparedness" from the housetops! And yet no American that ever lived desired peace with greater intentness than did President Roosevelt. But he was thoroughly aware of the fact—since, adequately proven!—that "Peace" is as yet by no means universal in the hearts of mankind. I remember one of his favorite maxims: "It is a good lesson for nations and individuals to learn, never to hit if it can be helped, and never to hit soft!"

Under the Harding administration many strides forward have been taken, and are being taken, for the well-being and safety of the nation, and the War Department, recognizing the potential value of the cordial and sympathetic co-operation of amateur radio energy, has decided to undertake a carefully-laid plan to further encourage amateurs in their radio efforts, and at the same time to lay the foundations for a most useful—and very large—body of men, should occasion ever arise for their need.

Through the courtesy of The Signal Officer, Ninth Corps Area, stationed at San Francisco, I have been supplied with as much data as is—so far—available—and that deals with the formation, in November, of a force to be officially known as "**Organized Reserves**"—of which The Signal Corps, Reserve, will be one branch. Members of this Corps will be taken from the amateur rank and file, according to certain qualifications and gradings—to be formally announced at a later date.

Ere I proceed to give a brief resume of the intents of the War Department along these lines, I would earnestly point out to all amateurs that this is an opportunity—not only to advance their own radio education, vastly—but an opportunity of great strategic value, of vast importance, and one that no red-blooded American amateur radio operator—boy or man!—should heedlessly pass by! To me, the greatest sin of them all is: **lack of patriotism!** In other words—the spirit that permits Bill to go out and fight!

The story—writ' large in the Hall of Eternal Records—telling of American deeds on European fields of battle must ever be an incentive to us who follow after! An incentive to emulate, that must NOT be allowed to become tarnished by Time and dulled by Forgetfulness!

Now then: (quoting from official information):

"Congress has authorized the organization of a branch of the Army of the United States, to be known as the '**Organized Reserves**'. Training will be given members, subject to the availability of appropriations, by attendance at camp for a period probably not to exceed two weeks each year, all clothing, equipment, and subsistence to be furnished by the United States for the purpose and period of training, and the regulations provide that each member of the Reserve Corps reporting at camp will receive five cents per mile travel allowance.

"The mobilization of the members of the enlisted Reserve Corps is effected through mobilization of the organizations to which they are assigned or attached. Orders directing mobilization will be transmitted through the usual channels. If a certain Signal Corps Unit were ordered out for two weeks' training, members of the unit would be notified, and—according to existing regulations—would be given 60 days in which to prepare for leave of absence from their usual duties.

"In order to have the most successful period of training, members of the radio company should be as nearly radio operators as possible, before going to camp. Training before going to camp is, therefore, **essential**. This is important, also, in that were an **emergency to develop**, these men would be ready immediately upon mobilization to give our Army the very best, quickest and most available communication possible—by radio telegraphy.

"There are apparently two methods of procedure: **First**—to fill up the organization with amateurs who are well ad-

vanced in radio, and who may be used as a nucleus for the organization of a Corps radio net, purposed to give instruction in radio telegraphy, and which would begin functioning immediately the organization is completed. **Second**—to secure as the balance, those amateurs whose education can be advanced by such code training and other instruction as the Signal Corps is able to provide, by using the means at hand—particularly the new stations under construction—and by correspondence instruction.

"As to those of the first class mentioned: There is little that can actually be done for them in instruction, except perhaps high speed code training and the development of their knowledge of Signal Corps duties, by distribution of Signal Corps literature and subsequent discussion of same by correspondence. The establishment of the Corps Area amateur reserve net would of course include the stations now controlled and operated by the amateurs of the first class, and control stations could be established which could co-ordinate the practice traffic. In addition, it is thought entirely practicable to grant permission to any amateurs, members of the Reserve Corps to visit any of the Signal Corps stations and "sit in" under the direction of the operator in charge, and thus secure practice in handling traffic. No practice code or traffic should be handled on a wave or at a time which would interfere with the regular American Radio Relay or other amateur activities.

"The training in code will be a function of the Signal Corps stations now under construction. It is possible that outlying stations, owned and operated by members of the Reserve Corps, would be called upon to relay practice traffic and code, and, if so, the Signal Corps would furnish (if it can be arranged), the relay apparatus. Also, in an emergency the more powerful and better of the amateur stations would certainly be of great assistance to the Army. Relaying is mentioned because we do not know as yet just what results will be secured from the new Signal Corps stations.

"It is hoped that the second class mentioned will be, at first, in the minority. In any event, their education must be undertaken. It is probable that a correspondence course on Signal Corps radio equipment, which would obviously be a course of instruction covering radio in general, and only specializing on Signal Corps radio equipment, would be entirely feasible. In addition, the Signal Corps would attempt to send out code instruction to this class—also, at regular intervals to maintain liaison by correcting code lessons sent in.

"The radio stations under construction in the Ninth Corps Area will be at the Presidio, San Francisco, California; Fort D. A. Russell, Wyoming, near Cheyenne; and at Fort Douglas, Utah, near Salt Lake City. If the tube transmitters work as expected, a daylight range of 1000 miles C. W. transmission should be secured, and at least 300 miles daylight telephone transmission. Several others are being constructed throughout the country and will form the Army radio net of the United States. At such places as the Signal Corps School of Presidio of San Francisco, instruments will be available for the calibration of amateur sets, and every assistance will be given members of the Reserve with a view to the development of their sets and advancement of their education. It is contemplated that at scheduled times, signals will be sent from the Signal Corps stations in this Corps Area on certain definite and standardized wave lengths, which will be of great assistance to operators in the precise calibration of their receiving apparatus.

"The time is not quite ripe for applications to be filed for membership in the Reserves. Complete information regarding this will be published as soon as available.

"If the patriotically inclined young man can only be made to realize that he is a part of the 'big scheme' and that he or his station may be called upon to actually function as an invaluable link in our lines of communication, were a national crisis to arise, it is possible he may give his sincere co-operation to the development of our amateur radio reserve. There is a large quantity of first class, live amateurs, of eligible age, who would surely make up the personnel of a fine organization. It is hoped that we can interest men of good education, so that the organization as a whole will be composed of the very 'top-notchers' of the amateur fraternity."

More words of mine are unnecessary!

The above **MUST** appeal to American youth and manhood! I shall be deeply interested to watch future developments, as my faith in my fellow countrymen is—**unbounded!**

I would suggest that all inquiries for further information be addressed directly to **The Signal Officer, Ninth Corps Area, The Presidio, San Francisco**—and not to me, as I should but have to make inquiry of him—anyway!

LET'S GO!

Construction of a 20-Watt C. W. and Radio Telephone Set

By O. Schuwendt

A COMPACT and efficient four-tube C. W. and radio telephone set built by the writer may be duplicated by any experimenter who will study and apply the directions in this article. The set, as originally designed and built, uses four 5 watt V.T.2 transmitter tubes as oscillators. With a plate voltage of between 350 and 375 volts no difficulty is experienced in obtaining a radiation of between $\frac{3}{4}$ and 1 ampere, although with Radiotron, Cunningham or A.P. transmitter tubes, which the writer advises the prospective builder to use in the set, a radiation of between $1\frac{1}{2}$ and 2 amperes should be easily obtained without overloading the tubes.

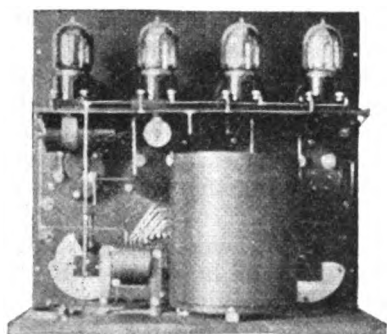


Fig. 1 (Above) Rear view of panel.

Fig. 2 (To Right) General Assembly Drawing.

The arrangement of the various pieces of apparatus required in the construction of a highly efficient C.W. transmitter must be compact. Short connecting leads are essential. But compactness must not give way to efficiency. The general arrangement of mounting the apparatus shown on the panel in illustration is an excellent one. Care must be exercised in wiring the transmitter in such a manner that the high tension leads will not interfere with those carrying the low tension current. Nickel plated hard-drawn copper wire is well adapted for the bus-bar type of connections. Rounded corners and firmly soldered connections will not only add to the appearance of the wiring, but will prevent loss from leakage. All connections terminating into binding posts should be soldered. Do not depend on screw-and-nut connections. They will often work loose.

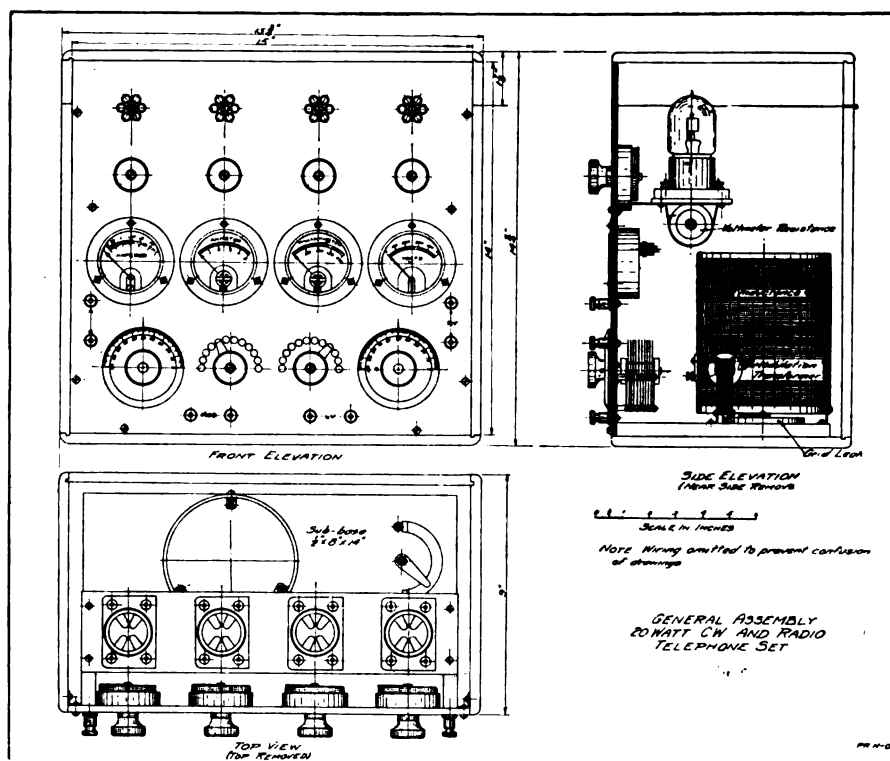


Fig. 1 is a rear view of the panel removed from the cabinet. The builder should note especially the rigid type of bus wiring used, all connections being as straight and direct as possible. Fig. 2 is a general assembly drawing which will help to make clear certain points which cannot be readily seen from the photographs.

Referring to the drawing Fig. 2, the holes at the top of the panel are for observing the brilliancy of the filaments when the tubes are lighted. The rows of knobs, directly below these holes, are the knobs of the rheostats for controlling the filament current of the tubes. The row of meters below the rheostats are, from left to right, hot-wire ammeter, filament ammeter, plate milliammeter and voltmeter. Below these meters are the aerial tuning condenser, wave length switch, plate circuit switch and grid condenser. The two binding posts at the left of the panel are for aerial and ground connections, while those at the right are for connection to the high voltage source. The two lower right hand posts are for filament current, while the two at

the lower left are for the source of modulation and are connected to the primary of the modulation transformer. By connecting either a battery and microphone or a buzzer and battery in series with a key to these posts the set may be used for voice transmission or buzzer modulated telegraphy respectively.

No means is provided in the set proper to change rapidly from one method to the other, but this can easily be taken care of by means of a small single pole double throw switch outside the set. For straight C. W. telegraphy the writer believes that the best method to use is the compensated wave, by placing a key in the ground lead with seven or eight turns of

heavy wire wound in a coil 3 inches in diameter connected across its binding posts. This will make the emitted wave length about 8 meters longer with the key up than when it is depressed, and on 200 meters this is enough difference to eliminate the sound of the other wave when tuned to either one.

In Fig. 3 is shown the wiring diagram from which can be seen that the circuit used is the familiar Colpitts with grid method of modulation. While this method of modulation is not the best, it is the belief of the writer that the set will be used more for straight C. W. telegraphy than for either buzzer modulated telegraphy or radio telephony by the average experimenter, and therefore the builder can afford to sacrifice somewhat on the degree of modulation in order that he may have the two extra tubes available for use as oscillators and consequently more output without using a complicated switching arrangement to accomplish this, as would be the case if they were used for modulating.

In the wiring diagram the following designations are used:

L—Inductance (see further description).
 C-1—Aerial tuning condenser .001 mfd.
 C-2—Grid condenser .0005 mfd.
 C-3—Filter condensers 1 mfd. 1000 volt tested.
 R-1—Filament rheostats.
 R-2—Grid leak 10,000 ohm semi-circular graphite potentiometer.
 B-1—Filament battery. Low voltage A.C. from step down transformer may be used.
 B-2—6 volt battery to operate buzzer and transmitter for modulation.
 MA—Milliammeter.
 A—Filament ammeter.
 V—Voltmeter.
 HWA—Hot-wire ammeter.
 HFC—High frequency choke coll.
 AFC—Low frequency choke colls.
 MT—Modulation transformer.
 Buz.—Buzzer.
 Mic.—Microphone transmitter.
 Sw.—S.P.D.T. switch for changing from voice to buzzer modulation.
 G.—High voltage generator or other source of high voltage.

The range of the milliammeter and the hot-wire ammeter will be determined by the kind of tubes that are to be used. If the builder intends to use A-P tubes the range may be 0-200 milliamperes while the hot-wire ammeter may be 0-2 amperes. Although the above milliammeter will just cover the current consumption of four Radiotron or Cunningham tubes when operating under normal load, it is well to have a meter which has a small surplus in range. A stock range meter for 300 milliamperes would be preferable to the 200 milliamperes instrument for these tubes. The hot-wire ammeter should likewise be of greater range for these tubes and should be the next stock range or 3 amperes. The filament ammeter may have a range of 5 amperes for A-P tubes or 10 amperes for the other tubes, but if A.C. is used to light the filaments, it should be replaced with a 0-15 volt A.C. voltmeter connected across the filament terminals instead of in series, as the ammeter is shown in the diagram. The hot-wire ammeter might well be of General Radio make, while the other instruments might be Weston or Jewell. The voltmeter V, should have a range of 500 volts, as the voltage that may be used on the Radiotrons might run up to 400 or 450 volts for a short time if the tubes are to be overloaded.

Panel

In constructing the set it is well to start with the panel. In Fig. 3 a complete drilling layout is given with the centers of all holes, except those which will vary for different kinds of instruments, etc., that may be used, located with respect to two edges of the panel. The sizes of drills are also given and it will be seen that they are sizes that every amateur has, or should have, on hand, as they are often needed in construction of instruments.

Before attempting to do any drilling the panel should be laid out full size on a sheet of drawing paper with all holes located on it. This sheet should then be fastened to the Bakelite or Formica panel and the centers for the holes marked through on to the panel with a sharp prick punch. This method gives a good center for the drills and insures the holes being exactly where they are wanted. It is a good idea to drill through the panel with a small drill for all holes before using the specified size of drill. In drilling the observation holes a hole should be drilled through the panel with a small drill as stated above and then the countersinking should be done on both sides with the $\frac{3}{8}$ -inch diameter drill, after which the hole is drilled through with a $\frac{1}{4}$ -inch diameter drill. The hole is countersunk on the rear side of the panel more as a matter of neatness than anything else.

The holes for the meters present the only difficult part of the panel, and if they are cut out with a bracket saw very little difficulty should be experienced. How-

ever, if the builder does not have such a saw it will be necessary to drill a series of small holes around the circumference of the openings and afterwards smooth the hole up with a half-round file. It should be noticed that two dimensions are given for the holes for mounting the tube shelf brackets. This is on account of the difference in size of the A-P and the Radiotron or Cunningham tubes. If the builder is not certain which type of tube he will use it would be best to drill for the latter tubes as, although the A-P tubes will be rather low behind the observation holes, they can easily be seen, and this will prevent the necessity of changing the drilling later in case the tubes are changed.

The tube shelf is an easy job requiring only a few holes to be drilled, as shown in Fig. 3. Remler sockets are used and the holes provided for table mounting are to be tapped for 6-32 machine screws. They are then placed one at a time in the proper position on the tube shelf and the holes spotted on it. The holes are then drilled with a No. 27 drill and 6-32 machine screws $\frac{1}{2}$ inch long are put through from the under side into the holes that were tapped in the socket base.

The brackets for mounting the shelf on the panel will need no description and should be made to the dimensions shown in Fig. 3 if Paragon rheostats are to be used. However, if other types of rheostats are used the builder should make sure that the shelf will clear them by at least $\frac{1}{2}$ inch.

The sub-base should be made of wood $\frac{1}{2}$ -inch thick by 8 inches by 14 inches and should be fastened to the panel by means of two round head nickel-plated wood screws, put through the holes provided for that purpose. The sub-base should be given a coat of shellac before fastening it to the panel.

Inductance

The inductance, L, is wound on a Formica tube 5 inches in diameter and 6 inches long with ten grooved turns to the inch turned in its outer surface. It should be wound with either No. 12 or No. 14 bare copper wire, preferably the former if Radiotron tubes are to be used. Taps should be taken off every five turns, giving a total of fifty-five turns for the twelve taps. These taps should be made with the same size wire as that with which the inductance is wound and should be soldered on to the proper turns after the tube is wound.

The inductance is fastened to the sub-base with the supports shown in Fig. 3 and should be placed directly in line with the aerial switch on the panel, with the back part flush with the rear of the sub-base, as can be seen from the top view in Fig. 2. The taps should be brought to the switch points in as neat a manner as possible and should be kept as far apart as possible. When properly done they will fan out in a neat semi-circle. The points of the two switches are connected together with the same size wire as the inductance is wound with, in such a manner that the two outside taps are connected together, and any other tap on one switch is connected to the corresponding tap in rotation on the other side. This can be seen in Fig. 1. The best method of fastening the wires to the taps is to drill a hole a short way into the tap just large enough for the wire to slip into and then solder it in place. This method is also used in fastening the wiring of the set to the binding posts.

The aerial and grid condensers can be of any make so long as they have the plates sufficiently spaced to permit their being used on 500 volts without breaking down.

Transformers

The 10,000 ohm potentiometer used for a grid leak is mounted on the sub-base as can be seen in the top view, Fig. 2. The modulation transformer is also mounted on the sub-base and is preferably of Acme or other standard make, although if the builder desires he can build a serviceable one himself according to dimensions given in Fig. 3. The core is made up of thin transformer core iron $\frac{1}{2}$ inch wide to the dimensions of $1\frac{3}{4}$ inches by $2\frac{3}{4}$ inches. The primary consists of about 300 turns of number 26 S. C. wire and has a few layers of fish paper or heavy shellaced paper over it. The secondary is one section of Ford spark coil secondary with about half the wire removed. The exact amount to remove will have to be determined by trial, as the entire secondary has too high a resistance and the tubes will not oscillate with it all in. Enough should be left so that the ratio of primary to secondary turns is not too small for good modulation. A suggested method of mounting is given in Fig. 3.

The high frequency choke coil, H. F. C. in the diagram, is wound with about 300 turns of No. 26 S. S. C. wire on a thread spool. The hole in the spool is plugged with wood and two small brass angles are made and fastened to the spool ends with small wood screws. Holes are drilled in the other legs of the angles to match the holes in the tube socket bases and it is then mounted under the tube shelf by means of

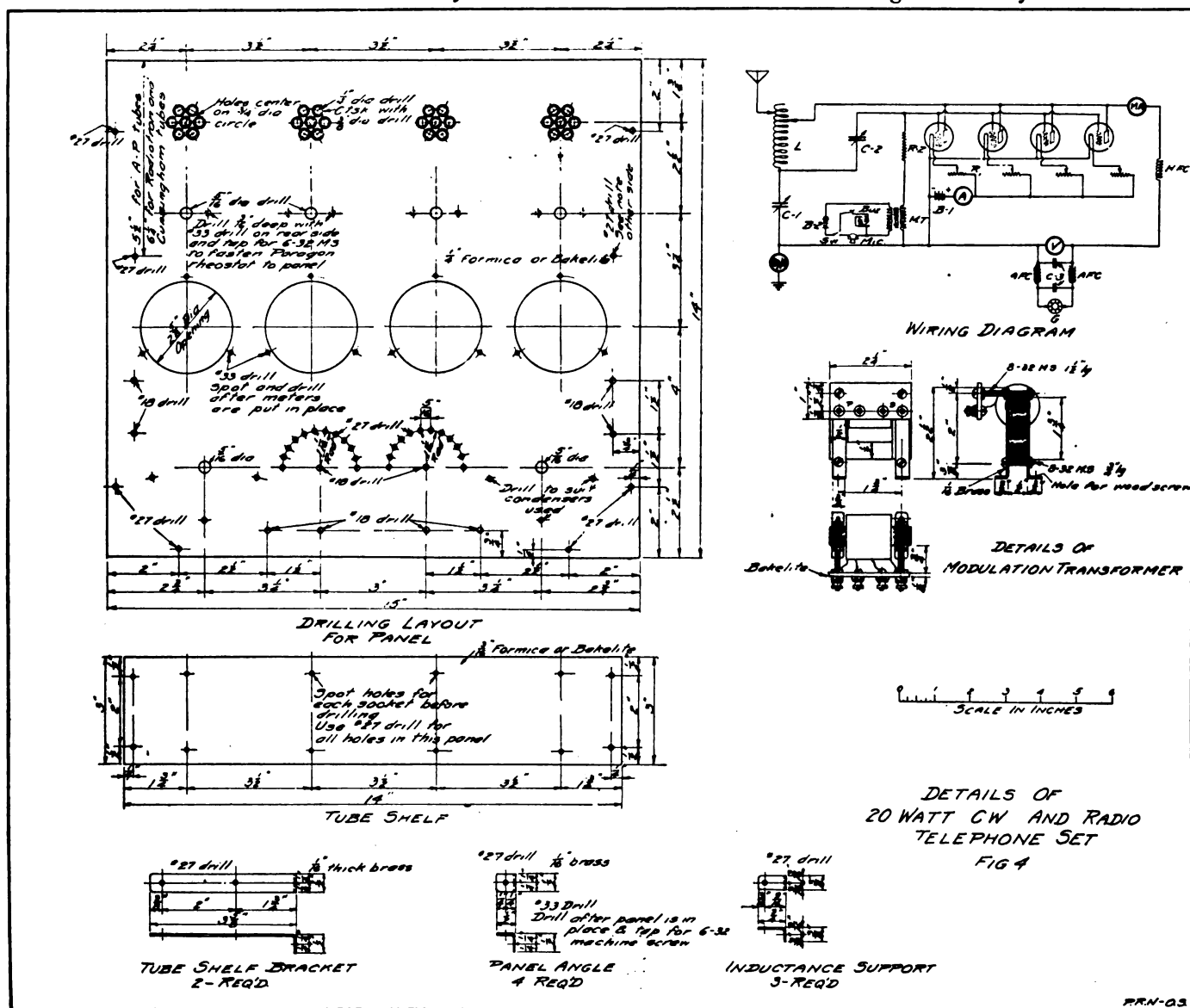
two screws which also hold a socket in place. The external resistance for the 500 volt voltmeter is fastened under the shelf in a similar manner with a strip of brass. This method of fastening can be seen in Fig. 1. No definite dimensions for the angles or strap can be given as the size of the spool and resistance may vary in each particular case.

Although the filter system can be mounted directly in the cabinet it is preferable to mount it in a box or cabinet near the motor-generator set or near the transformer and rectifier if rectified A. C. is used. Although 150 milliampere capacity choke coils could be used they would be overloaded, and if the set were to be used for very long stretches, would be inefficient. It would, therefore, be advisable to use 500 milliampere capacity choke coils. The condensers should be tested at not less than 1000 volts even though no greater plate voltage than 350 volts is used, as a high voltage surge may cause a condenser of lower voltage capacity to puncture even on that low voltage.

The generator is preferably one for 500 volts, as with a 5000 ohm variable resistance in the field circuit the voltage can easily be brought down to 350 volts and yet the operator will have a chance to use a higher voltage if necessary or desirable.

Cabinet

The cabinet is built of $\frac{3}{8}$ -inch mahogany to the dimensions shown in Fig. 2. The joints should be



made with some form of lock joint to prevent the wood from warping and pulling apart. The cover is hinged at the back to allow removal or insertion of tubes and inspection of the interior. Small strips about $\frac{1}{8}$ -inch thick and 1 inch wide are glued on the inside on each side of the cover and are allowed to go about $\frac{1}{4}$ inch below the bottom edge so that when the cover is closed they are inside of the bottom part of the cabinet, preventing the cover from twisting side ways. The panel is fastened in place by means of the small brass angles shown in Fig. 3. They should be fastened to the inside of the cabinet in the proper place and then the holes spotted to match those in the panel, after which they should be drilled and tapped for machine screws to hold it in place, as noted on the drawing. The cabinet should be finished and given a good polish.

A word about the wiring: This should all be done with the same size wire as used in the inductance and should be bare copper. All joints are soldered wherever possible and connections are made as straight and short as possible and kept well apart.

Operation

In operating the set the tubes should first be lighted and the high voltage turned on. Care should be taken to have the aerial circuit connected to the set, as this forms part of the circuit. The bulbs will not oscillate when it is disconnected and also will be overloaded.

The switch connected to the aerial binding post and the condenser C-1 determine the wave length, while the switch connected to the plates is varied to find the best point of coupling for the various wavelengths employed. With the aerial switch set on about the third or fourth point from the left, according to the size of the aerial, vary the capacity of C-1 until maximum radiation is obtained. Then vary the plate circuit switch until maximum radiation is obtained. Maximum radiation will usually be obtained with a minimum reading of the plate milliammeter. The adjustments should all be gone over a second time as they are dependent on one another and a change in one adjustment usually requires a slight change in the others.

The grid condenser should be carefully adjusted

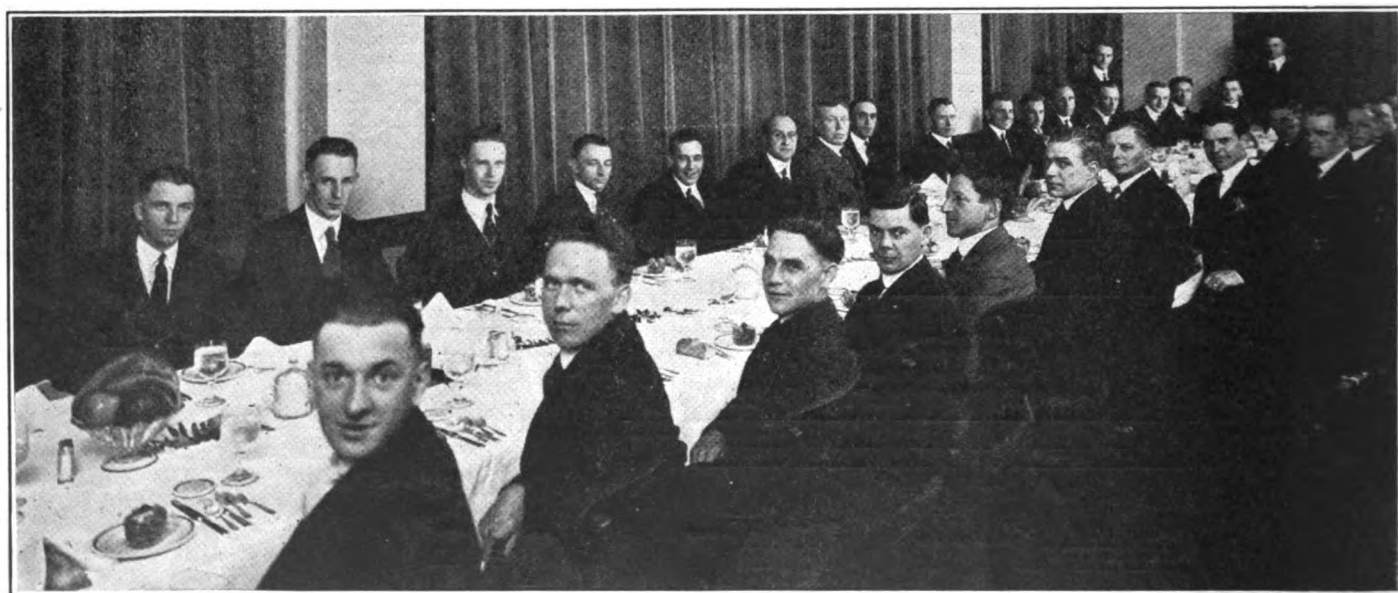
when using voice or buzzer modulation, as upon this depends the clearness of modulation in this system. The grid leak should also be carefully adjusted as a certain value is necessary to make the tubes oscillate properly. It is also necessary to change its value according to the number of tubes in use, for less number of tubes the resistance being made higher. Once set it needs no further adjustment so long as the tubes themselves or the number of tubes are not changed.

RADIO DEALERS GET TOGETHER

Plans for an organization of those interested in better service to the buyers of radio equipment were discussed during a get-together meeting of California radio dealers and manufacturers called at the Engineers' Club, San Francisco, August 19th, by H. W. Dickow, of the Pacific Radio News. As a result, the Pacific Radio Trade Association was successfully launched September 16th with the adoption of a constitution and by-laws, the election of officers and the appointment of committees to work for the betterment and stabilization of conditions in the radio business.

After dinner at the first meeting, which was enlivened by special radio music from the California Theater, Mr. Dickow, as toastmaster, introduced Major J. F. Dillon, U. S. Radio Inspector, who encouraged the formation of such an association and gave statistics showing the rapid growth of radio activities on the coast. H. L. Newnan of Los Angeles was next called upon to speak for Southern California and assured the support of the south for such a movement. Arthur H. Halloran was then introduced as the new editor of Pacific Radio News, and gave an address on the benefits and advantages that had been derived from co-operation by other branches of the electrical industry. After a general discussion by all present it was decided to form an association, Mr. Halloran being elected temporary chairman and Max Loewenthal, secretary pro tem. Lieutenant Ellery W. Stone and E. T. Cunningham were requested to represent the association at the Chicago meeting of the American Radio League.

Proceedings of the organization meeting of September 16th will appear in these columns next month.



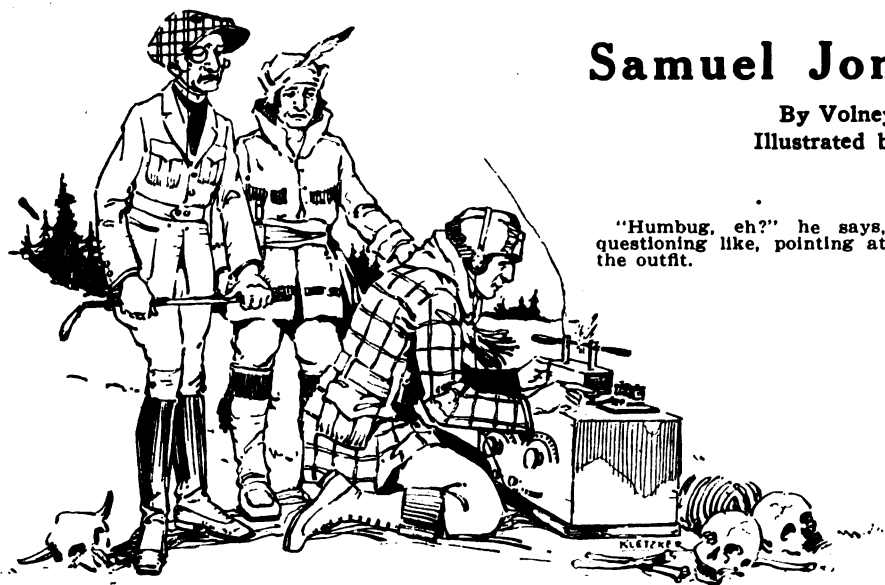
GET-TOGETHER DINNER OF CALIFORNIA RADIO DEALERS AND MANUFACTURERS

Starting at the left and going around the table those present at the initial meeting are seen by the picture to be E. G. Arnold, D. Lambert, Harry J. Rathbun, F. P. Ingel, H. J. Malarin, Max Loewenthal, Major J. F. Dillon, H. W. Dickow, A. H. Halloran, E. L. McDonnell, F. W. Maxwell, L. H. Waldron, E. T. Cunningham, S. Peterson,

L. O. Fassett, E. G. Danielson, H. L. Newnan, O. H. Miller, J. A. Ramsey, L. Ets Hokin, N. R. Kuhn, J. W. A. L. Willis, E. W. Stone, D. E. Lyon, J. L. Swindelle, A. F. Pendleton, J. K. Fairchild, H. C. Hopkins, A. E. Evans, V. G. Mathison and Edward McGuire. In charge of the concert were: B. F. McNamee of the Pacific Radio Supplies Co., and E. A. Portal of the Colin B. Kennedy Co.

Samuel Jones—Humbug

By Volney G. Mathison
Illustrated by H. Klatz-Ker



OLD MUCKASHOUK, the Snow-Eater, doesn't believe in wireless. Muckashouk is an Aleute chief with a pedigree as long as the Alaska peninsula upon which he was born—a grouchy old Indian with a widespread fame as a hunter and guide on the bear-trails of the mainland, up behind the Shumagin Islands.

For forty years he had been coming from his dugout over at Portage Bay in his kyak to Unga Island to buy tea and sugar at the Alaska Codfish Company's trading store at Unga; and all those forty years nothing had ever happened at the little codfishing village worthy of his notice until Hell-Fire, the white-man lunatic, came from Frisco with a load of poles and boxes and machinery and built K-V-I.

Hence, Muckashouk was more astonished than he would admit, when he came to Unga after a long absence to find two tall masts up on the hill, where there had never been anything before but a flagpole; and down on the ledge on the face of the cliff below, a whitepainted shack with a black pipe sticking out of one end, showing that it contained one of the gasoline-demons that bark and belch fire and go like blazes.

Intensely curious, Muckashouk footed it up the hill and studied the tall, straight masts, with their taut steel stays and shining goose-egg insulators, and the thin gleaming bronze strands that were stretched between. He mooched down to the shack, obtained admittance, and inspected the gasoline abomination and the big black iron pigs that were belted to it; stared at the clocks with the senseless dials; listened with much mystification to the cheeping of the snow-birds in the black snuff-boxes; and bravely held his ground when the fire-devils spit their purple flames from the teeth of the humming wheel.

But even all these strange things were hardly enough to convince Muckashouk that the flustery, bristle-haired *wirelessuck* fellow could really talk to the people five days away in Dutch Harbor and Mershovoi, without sending a messenger in a boat. However, he risked three good round cart-wheels and some small change to venture a message to Mouksic, the Medicine Man at Kodiak, requesting him to send by the spring mail-boat, just leaving, some medicine for a sick Malamute dog that Muckashouk had brought along with him from the mainland.

A message from Unga to Kodiak is relayed from N-P-R to N-P-Q, thence to N-P-S; and perhaps through the carelessness of some gob suffering with an overcharge of home-brew, Muckashouk's message was lost in transit.

The mail schooner came, but brought no medicine, the sick dog died, and Muckashouk had fresh proof that all white men are liars. Standing over his deceased Malamute, he glanced contemptuously up at the masts and stays and copper wires on the hill.

"Humbug!" he growled, deep down in his throat; and, having thus fully and completely expressed his opinion of radio, he relapsed into his customary silence and wordlessness that would have made the glummiest Scot a magpie in comparison. From that time Muckashouk nursed an undying grudge against devil-fire machines and *wirelessucks* in general.

And so matters stood the following spring when our old friend Samuel Jones breezed in on one of the company's fishing schooners, to pound the brass at K-V-I.

Having been duly initiated by the codfish-snailers, and later going through an unfortunate affair with a female gumshoer of the Alaska dry-squad, Samuel Jones had a few days of calm before the next hurricane burst upon him, in the shape of his lordship, Sir Ambrosius Brawley, in his radio-equipped steam yacht, "*Elizabeth*," on a tour round the world.

Sir Ambrosius had heard of the famous grizzlies of the Alaskan peninsula, and, determined upon a hunting-expedition, he anchored his trim yacht off the village of Unga and came ashore to negotiate for hunting-equipment and a guide.

Guns and provisions were had at the company's trading-store; and Muckashouk, on his semi-annual visit to the village, was signed up as guide. Tin-Pan Smith and Hammer the Head-Cracker, along with two Aleutes, were taken on as packers, and Greasy Bill shipped as cook. While preparations were under way, Lord Brawley called upon Samuel Jones and made an unexpected request. Could Mr. Jones, in view of a specified liberal remuneration, arrange a portable radio outfit and accompany the expedition, in order that his lordship might be kept in touch with her ladykins aboard the "*Elizabeth*"?

The Brainless Swede, supe of the Alaska Codfish Company, was strong for the

idea. He would be glad to see K-V-I closed up for a few weeks; it would give him a rest from the eternal howls from the home office for less expense and more fish. But Samuel Jones had a premonition that fresh calamity would surely befall him, were he to go wandering with this dense and dudish monocle-juggler, on the trails of the mainland grizzlies. He could not openly refuse without bringing down upon himself the stigma of being a timid tenderfoot, and that meant much attendant evil; so he prudently chose a convenient loophole of escape.

II

LIKE to go first-rate, I assures Sir Ambrosius; but I haven't got anything I could rig up a portable set with. "Don't let that worry you, Sam," chips in old Dopey Driffield, postmaster, squaw-masher, an' town pest. "Ya kin have my ham set Hell-Fire fixed up fer me. I'm tired a it, anyhow."

"Thanks, Dopey," I answers, grin' at him. There was no refusin' now. A dory-carpenter slaps together a light box, in which I puts Dopey's loose-coupler an' audion-panel, his two-inch spark-coil, straight-gap, sendin'-key, an' a little aerial-switch. In another box, I stows eighteen dry-batteries, six for the audion an' twelve for the spark-coil, which I figures will hold up for intermittent work durin' the three or four weeks of the huntin'-trip.

"The carpenter also fixes up a light, jointed wooden mast, which along with a couple of insulators and a coil of aerial-wire, I puts aboard the gas-boat Sir Ambrosius has chartered to carry us to the mainland.

"Seein' the outfit come aboard, old Muckashouk looks it over with an angry frown; then, with a kind'a sour smile, he studies me a while out of the corner of his eye.

"Humbug!" he croaks; after which he freezes up once more, like a mainland glacier.

"At last we gets headed up the Straits of Nagai for the mainland, an' the '*Elizabeth*' follows us up to Portage Bay, where she drops anchor. We piles our gear ashore in Man-Eater's Cove, where we spends the first night. Next mornin' the packers bundle up the stuff, which, as Tin-Pan remarks to the Head-Cracker, is enough to fit out an invasion into Siberia.

"For three days we struggles up Skelton Gulch to Dead-Man's Plateau, a broad piece of high snow-country, about twenty miles inland from Portage Bay, surrounded by great mountains of snow-covered granite, an' Pavloff Volcano smokin' in the background, like a gigantic inverted ice-cream cone. Off to the south'ard, we could see the Shumagin Islands, lookin' like white sugar lumps in the Pacific; an' on the other side of the peninsula, to the north, we could make out great fields of pack-ice floatin' on the

Just say:

RADIO

to your newsdealer on October 25th and he will hand you the snappiest radio publication that you have ever read.

cold, gray surface of the Bering Sea.

"It's a grand sight, ain't it!" I exclaims to Tin-Pan, alongside me.

"Yes, fer a tenderfoot that ain't got nothin' else t' do but look at it!" growls Tin-Pan, throwin' his enormous bundle down in the snow. 'I'd like t' know what his dukelet's got in this ship-load I bin packin' all over th' Laska peninsula. It's big enough to contain a coupla circus tents an' all th' side-shows.

"Muckashouk had brought us up alongside of Silver Creek, where there was water, an' alder-brush for a fire. We clears away a place an' make camp. There was one little tent for his lordly skeezix, an' another larger one for the remainin' seven of us.

"Greasy Bill fixes up some supper, after which Sir Ambrosius opens up Tin-Pan's pack an' takes out a rubber bundle an' some wooden sticks. We couldn't make head or tail of the thing till he sets it up;—an' then we sees it's a foldin' bath-tub!

"Well, I'm a dirty salmon-eater!" groans Tin-Pan, as he watches his lordship settin' up over the tub a little tent, which was also in the bundle. "I think that Tin-Pan Smith, who's et more sour-dough biscuits than any denizen livin' on this here peninsula, should live to see hisself packin'—that! I'm ruined! I'm disgraced fer life!" an' he begins to sniffle.

"It's a howlin' outrage!" sympathizes the Head-Cracker, with a catch in his voice. "I never thought people could be so cussed ornery. Hereafter, we pack no bundles without seein' what's in 'em!"

"About this time Sir Ambrosius has his bathin' establishment ready for operation.

"Aw—I sy!" he chirps to Greasy Bill, who's just finished cleanin' his fryin'-pan. "Would you be so kind as to procure a drop of watuh in one of those tin—aw—containuhs and heat it a bit oveh th' fuuh. I aven't had a bloomin' bawth these three days—I feah I shall become ill!"

"Ill," he says!!" sniffs the Head-Cracker, "I bet old Muckashouk here ain't had a bath in fourteen years!"

"Fifteen," says Muckashouk.

"Cursin' under his breath till he was black in the face, Greasy Bill gets a can of water an' holds it over the fire on a stick, while Sir Ambrosius holds onto his monocle an' superintends the job.

"Meanwhile, the Head-Cracker helps me stick up the jointed wireless mast in a crevice of a handy granite cliff, an' I manages a kind of a ground in the creek. Openin' up the apparatus-box, I adjusts the coil for a nice, smooth spark. By the time I had her all ready it was about dark, so I gives the 'Elizabeth' a call.

"It was all of twenty miles from Dead-Man's Plateau to Portage Bay, but we were on pretty high ground, an' anyway in Alaska wireless gives results; so I wasn't much surprised to hear the bird on the yacht come back, right off the bat. When Sir Ambrosius finishes his bath, I asks him if he's got any message.

"Why—aw—yes," he replies, pleased-like, "You may inform her ladyship that the expedition is progressing—aw—beautifully; and that I have just had my bawth. Indubitably she will be glad to know that.

"As I works the 'Elizabeth' I notices that old Muckashouk keeps stickin' around, watchin' me with a kind of a sour smile! an' somehow it bothers me a good deal.

III

THE huntin' progresses with pretty good success; Sir Ambrosius succeeds in baggin' a couple of old mangy-

lookin' trophies; an' everybody seems to be quite contented except myself. Old Muckashouk keeps worryin' me more all the time. Whenever I work the outfit, he stands around with a kind of a dark, broodin' expression on his homely map, until finally I begins to feel sure that he's plottin' some kind of devilment against me an' the outfit.

"One day Muckashouk tells Sir Ambrosius about a famous buryin'-ground of the Aleutes, called Skull Island, thirty miles out in the Bering Sea; an' of course old I-Say makes up his mind he's got to see it.

"He tells us to break camp, but right then there begins a row about that bath-tub. Sir Ambrosius tries to insist on somebody packin' the thing, but the Head-Cracker rises up an' delivers a oration on the freedom of America an' human rights an' liberties that would'a made Daniel Webster sound like a street-corner sky-pilot on a soap-box.

"We absolutely an' perpetually refuse to be dishonored an' polluted by a horribul rubber bath-tub!" he concludes, wrathful-like. "We've packed feather pillers, an' we've packed canned termaters—we've even packed bakin'-powder,—but we don't transport that outrageous article from this place, even if the hills fall an' the mountains bust open!"

"So Sir Ambrosius packs it himself.

"We moves camp down to Herendeen Bay, over on the Bering Sea side of the peninsula, where Muckashouk charters a small open gas-boat from an old Indian shackin' there. As we planned to come back a different way, we stows all our gear in the boat.

"Right here, I gets my old reliable hunch that calamity is comin' my way on this trip, an' I tries to head it off.

"We better not go out there," I advises Sir Ambrosius. "I heard a weather report from Dutch Harbor that a terrific southwest hurricane is comin' this way. Safest thing is to go back to Portage Bay.

"You lie!" snaps Muckashouk, with a black scowl, "Me long time savvy—no come storm!"

"So we embarks; an' it was my luck that the sun shines an' the sea lies calm, like it never does in the Bering Sea once in fifty years. The gas-boat chugs along before a light southwesterly breeze; an' every little while old Muckashouk would squint up at the clear sky, an' then sneer scornful-like at me an' my wireless-box, until he blasted near gets my goat.

"Early in the afternoon, we sights Skull Island, a low, flat chunk of bare-lookin' black rock, about two thirds of a mile long, an' maybe half as wide, standin' solitary and gloomy out in the sea.

"I don't like th' idea a comin' way out here in this rickety old tub," grumbles the Head-Cracker, gazin' anxious-like back at the mainland, already droppin' down below the horizon. "There's a current runs like blazes out here; an' if we break down, it'll take us straight out into th' Berin' Sea about seven miles an' hour.

"I soon observes that this is a fact, for it takes us a long time to get up to the island. As we get close, I can see that the island is fringed with dark bluffs of volcanic rock, an' small reefy coves scattered in among 'em, one of which we runs into. Makin' a landin' we all pile ashore, leavin' Muckashouk in charge of the boat.

"We scrambles up onto the rough black rock above the beach,—an' then we halts right there. Standin' thick everywhere among the rocks an' boulders were hundreds upon hundreds of rude,

elevated platforms, each bearin' a shapeless, half-rotted bundle.

"This is a reg'lar old-time Siwash buryin'-ground, all right," mutters Tin-Pan, pointin' at the old rusted guns an' pots an' kettles on the platform, alongside the bundles. "That's the way they bury 'em—up in bird's nests, with all their worldly goods along with 'em."

"A few of the open-air graves looks kind'a recent, but most of 'em was old an' fallen to pieces. The ground was all littered up with the old rifles an' kettles, mixed up with bones an' skulls an' skeletons scattered in every direction. There was no part of the island free of 'em—even down on the beach, I notices ribs an' backbones strewed around among the rocks. It was a hair-raisin' sight; an' it didn't take me long to get enough of it.

"Nix on this!" I declares. "I'll be havin' th' jim-jams for th' next six months—me for the boat!"

"You said it!" pants Tin-Pan, followin' hard after me, "I ain't got no longin' fer a residence round this here island!"

"Neither me!" shivers the Head-Cracker. We all hot-foots it back down to the beach,—an' Sir Ambrosius ain't hangin' behind none to speak of. When Greasy Bill cranks up the engine, I notices that she don't seem to sound right; an' sure enough, just as we shoves off, she stops dead.

"Smells like gasoline's been leakin' some place," sniffs the Head-Cracker.

"Tin-Pan rams a stick down in the gas-tank, an' turns a sickly green.

"She's bone dry!" he gasps.

"Lookin' over the pipin', I discovers that it's cracked off at the carburetor, an' let the tank drain down into the slush-water in the bilges.

"We're in fer it now!" mumbles the Head-Cracker, talkin' like his mouth is full of glue, "We could make a sail out'a our blankets, but the wind's blowin' dead off the mainland—prob'ly'll keep blowin' that way till next fall, too. An' we can't buck that current paddlin'—this clumsy old tub ain't no Aleute kyak."

"I thought I seen a extra ten-gallon can of gas someplace," puffs Greasy Bill, who's rummagin' around in the bow; "but I was mistaken."

"Aw—I sy!" chirps Sir Ambrosius, who's just beginnin' to get it through his dense bean what's haopened. "We really must do something. The idea of spending the night 'ere among these bones and things is—aw—rawther disagreeable, don'cha know!"

"Disagreeable be —!" busts out the Head-Cracker, "It's one rotten blazin' blasted devil of a mess! There ain't even fresh water on this pile 'a bones an' rock!"

"Stop talkin' like that!" yells Tin-Pan, jumpin' up an' glarin' at the Head-Cracker. "I can't stand it! I can't stand it, I tell ya!"

"There was a gloomy silence; an' then Muckashouk, wearin' his old sour smile, speaks for the first an' last time durin' this conference.

"Wirelessuck!"

"Sufferin' cats, what's the matter with me!" I exclaims, jumpin' up. We gets the box of apparatus out of the boat, an' the gang sets up the little mast. In about fifteen minutes the outfit is ready for action, but by this time my enthusiasm is fallin' off.

"The island bein' low an' flat, there was no way to get more antenna elevation than the thirty feet of the single mast. The 'Elizabeth' was about fifty miles away, with a range of mountains between, an' it looked like a slim chance

(Continued on Page 112)

The C. W. Club of California

Conducted by Lawrence Mott, Associate Editor

DESCRIPTION OF 6XAD, CATALINA ISLAND

With the installation of his new 50-watt tube set, our associate editor, Mr. Lawrence Mott of Avalon, Cal., has one of the most up-to-date stations in Southern California. From the half-tone of his new station you can see that the spark has absolutely no chance at 6XAD.

Mr. Mott's first C.W. set employed 5-watt tubes. Exceptionally good work was accomplished with his initial equipment. The rapid development of C.W. and the advent of larger power tubes on the market prompted 6XAD to take another step in the direction of better C.W. work.

There is only one non-commercial station on Catalina Island and that is 6XAD. We will expect numerous record-breaking reports from Mr. Mott during the coming winter season. By that time, no doubt, the C.W. Club of California will be a "going concern" under the supervision of the Avalon station, and the use of C.W. for relay work in the West will soon replace the spark.



6XAD'S HOOKUP

Our readers will remember the photo of 6XAD's little C.W. set used by Mr. Mott some months ago. Look at the station now—C.W. apparatus from one end of the table to the other. All transmitting apparatus was constructed to Mr. Mott's specifications. Everything is downright modern. Looks like 6XAD will soon compete with 2QR in working Scotland.

LARGE NUMBER OF C.W. CLUB MEMBERS MAKE NECESSARY THE FOLLOWING REVISIONS IN SCHEDULE:

MONDAY, WEDNESDAY and FRIDAY nights these stations listed herewith will call for ten minutes each at the allotted period.

Time	Station	Wave	Name and Address
9:00 p.m.	6XAD	240 & 375	Lawrence Mott, Avalon, Cal.
9:10 p.m.	7OZ	200	Garrett Lewis, 1745 Willamette St., Eugene, Oregon.
9:20 p.m.	6PI	200	B. McGlashan, 233 W. 21st, Los Angeles.
9:30 p.m.	6EN	200	H. Duvall, 4965 Wadsworth, Los Angeles.
9:40 p.m.	6WU	200	C. Richardson, Los Angeles.
9:50 p.m.	6JE	200	C. Blalack, Los Angeles.
10:00 p.m.	6MK	200	L. B. Benjamin, Los Angeles.
10:10 p.m.	6ALE	200	W. W. Lindsay, Los Angeles.
10:20 p.m.	6KA	200	F. E. Nikirk, Los Angeles.
10:30 p.m.	6HU	200	H. G. Beck, Wilmington, Cal.
10:40 p.m.	6ADU	200	R. P. McKenzie, Los Angeles.
10:50 p.m.	6EF	200	C. G. Widing, Los Angeles.
11:00 p.m.	6IT	200	C. E. Rich, Glendale, Cal.

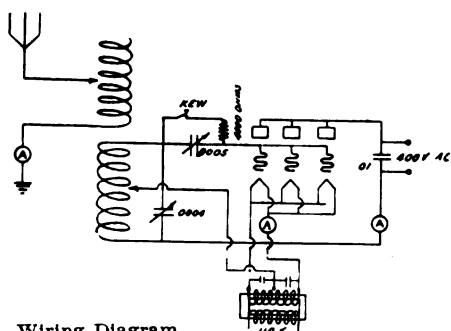
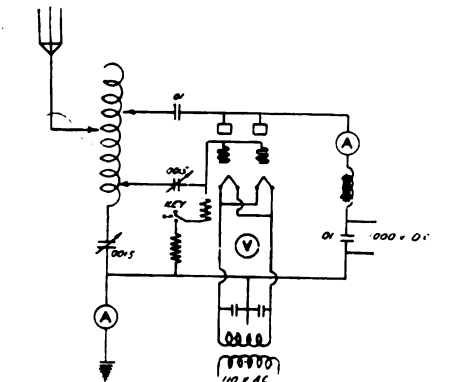
TUESDAY, THURSDAY and SATURDAY NIGHTS the following stations will call for ten minutes each:

Time	Station	Wave	Name and Address.
9:00 p.m.	6UC	200	C. F. Filstead, Los Angeles.
9:10 p.m.	6XN	375	A. A. Kluge, Los Angeles.
9:20 p.m.	6XD	375	Western Radio, Los Angeles.
9:30 p.m.	6AQA	200	G. S. Tichenor, Los Angeles.
9:40 p.m.	6KP	200	O. S. Garretson, Eagle Rock City, Cal.
9:50 p.m.	6BA	200	H. Newman, Wesrad, Los Angeles.
10:00 p.m.	6HK	200	F. Crosswell Jr., Los Angeles.
10:10 p.m.	6ZE	375	D. B. McGown, San Francisco.
10:20 p.m.	7XF	375	Northwestern Radio Mfg. Co., Portland.
10:30 p.m.	6ZAD	375	J. J. Mahler, Napa, Cal.
10:40 p.m.	6ZX	375	J. V. Wise, Fresno, Cal.
10:50 p.m.	5ZA	375	Louis Falconi, Roswell, New Mexico.
11:00 p.m.	6AKH	200	C. Maass, San Francisco.

These changes were made necessary by the ever increasing number of members who are joining the C.W. ranks. Many requests have been received to give each station ten minutes' working time instead of five minutes, as has heretofore been the custom. In order to make this change, it was necessary for us to split up the working nights of the members, giving them an opportunity of working ten minutes every other night instead of five minutes every night. There will be no regular calling and working schedule on Sunday nights. This will be made a "free for all" evening and is favored by the majority of the members.

We cannot impress upon the members too strongly the fact that the editor of this department desires to have a month-

ly report of the C.W. work accomplished during the month. This information will be published monthly on this page, and it is to the interest of all concerned to have each and every member send in a list of C.W. stations worked and heard during the month. This department is to be the mouthpiece of the ever growing C.W. organization that is being formed on the Pacific Coast. Photographs of stations entered in the above schedule are particularly desirable. Most of all we will ask you to send us some "C.W. BRIEFS" every month. Tell us what new wrinkles you have found in your C.W. work. Everybody wants to know about them. Let's make this the liveliest and fastest growing C.W. Club in the field. You can do your share by sending a monthly report to Mr. Mott at Avalon.



Wiring Diagram of 6XAD.

At the extreme left is seen the power plant especially built by the Advance Electric Co., of Los Angeles, to operate the 100-watt set—on 375. A 110 a.c. motor drives the generator, that delivers from 100 to 1000 volts d.c., and a plate current up to 500 milliamps. By a step-down transformer, shown next to the right, the filament current for the Radio Corporation tubes (203) is derived, from 1-10 volts.

Next comes the 2-tube transmitter itself, which the Western Radio Electric Co., Los Angeles, helped him build, using the above-mentioned tubes as shown in the accompanying print of hook-up. From 1.9—3.1 amps is the range—so far—in antenna current. But Mr. Mott is installing complete new ground and aerial systems in the early autumn, by which he will attain far better results than this!

(Continued on Page 92)

On the operating desk are: a Kennedy long-wave receiver and Kennedy 2-step amplifier; a Grebe short-wave, and 2-step amplifier—with special "pickle tube" detector; and on the extreme right is the transmitter used for short wave lengths—operating on 110 a.c., taken from the city main, through a special transformer. Radio Corporation tubes—UV202—5-watt—are used on this set, and Mr. Mott has been reported at 2000 miles' range on it. The amperage of the smaller set is from 1.2—2 amps, with three tubes working.

As Mr. Mott is also U. S. Deputy Game Warden at Catalina his passion for big game fishing is clearly shown by the excellent photographs on the wall of his den—all of swordfish, and tuna, taken by him and his guests—all fish more than usually large. What with being an ardent angler, that which he calls "an over-worked writer," and a close follower of the radio trail, our Associate Editor has not overly-much time to let the grass grow either beneath his fingers or his feet!

C. W. NEWSLETS

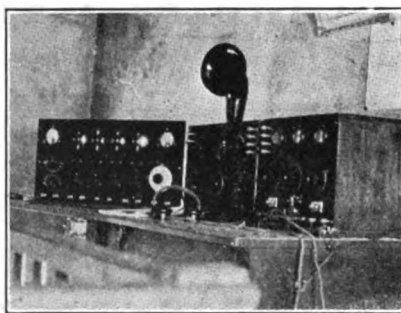
6AUL has been heard in British Columbia. He uses a four-tube set, hooked-up in Heising style.

6AUN has been heard by 7ZJ and 7EN. He used, at the time, a small set employing only one five-watt tube. His radiation without overload was eight tenths of an amp. Great work for only one tube. His new set will bring better news next month.

6AKH has almost finished his classy four-tube C.W. set. The Heising circuit will be used. Two separate panels comprise the transmitter. One is a power panel, the other is the oscillator panel. An ESCO 100-watt motor generator will feed the animal. A photo of the station will appear in an early issue on the C.W. page.

Many fellows won't have a C.W. set unless they can also have a spark set for calling purposes. What's the use of such foolishness with 26 members already signed-up for the C.W. Club? The trouble with C.W. is that the fellows will not tune for it. Don't keep your dials stuck on 200 meters. C.W. tunes too sharp. Juggle those dials a little and you'll be surprised at what you'll hear. But remember—you must tune sharp.

Wm. Woods, formerly of Oakland, Cal., has moved himself and his station to British Columbia. He is going to install a powerful C.W. set in the Barron Hotel and expects to have it on the job in about a month. That's a good place for a C.W. station, as it will be the aim of every C.W. Club member to work with Woods. He will broadcast the latest quotations on "Canadian Club" and other wet goods of old-time fame. Treat him right on the air and he will send you an invite to come up there to spend your vacation. Photo and full description of his new set coming up.



6AWT

6ALE has done some dandy work with his C.W. set. Look at this list of "heard and worked": 5ZA, on I.C.W. Very QSA. (6EN), (6EX), (6GN), (6HP), (6KP), (6MH), (6OH), (6PJ), (6TV), (6WZ), (6XD, phone), (6ZN), (6ZX—200 miles daylight), (6AAK), (6ABW), (6AGF), (6ALU, I.C.W.), (6AMW), (6APH), (6AUL—phone and C.W.), (6ZAD—C.W. old 6IY, (7ED), (7BK), (7KM), (7MF), (7ZJ). Great work, 6ALE. Keep it up.

7MF of Eugene, Oregon, and 7OZ, also of Eugene, have built 10-watt C.W. sets and tests have been arranged for the end of this month.

Mr. D. H. Keet of Riverside, Cal., reports that two new 100-watt C.W. sets will be in operation in that city within a few weeks. The Southland is going wild over C.W.

Mr. H. Romander of Smith River, Calif. (near the Oregon line) is building a 50-watt C.W. set. It will be on the air within a month.

6ZN. will also be on the job with a 100-watt C.W. set.

6GR will content himself with 10 watts.

6ASJ says that he wasted just about enough time fooling around with I.C.W. and will hereafter stick fast to the pure and unadulterated C.W. Next!!

6AUL of 'Frisco is being heard very nicely in Reedley, Calif., says Mr. Lindsay Jr. His C.W. signals are also coming through in grand style.

6ZAD has been pounding-in heavy on his C.W. The gang "down south" say he's very QSA.

6ALE, Mr. Lindsay, Reedley, Cal., says that he receives dozens of letters and cards from fellows who have been hearing his C.W. Almost everybody who writes 6ALE wants to know all about his set, how to build it, how it is wired, etc. The best way to answer that ques-

MY EXPERIENCES WITH C.W.

By C. Chandler Pidgeon

RECENTLY an article on the construction of a \$100 C.W. set was brought to my attention. Being a C.W. experimenter, I at once became interested, but the cost of construction of the set that I had planned was prohibitive. I therefore studied advertisements in the radio magazines and consumed the contents of the various CW catalogues with the result that it was possible for me to construct a CW set for \$50. The following is a list of what I used for the construction of the same:

6 lbs. Silicon Steel at 35c.....	\$ 2.10
1-2 lb. No. 30 enameled wire	1.06
1 lb. No. 20 SCC wire	1.58
18 ft. No. 14 DCC wire .....	.30
3 power tubes	24.00
3 sockets	4.50
3 rheostats (2½ amp.)	5.25
1 key	2.00
36 ft. copper tubing	4.12
Incidentals	5.00
Total	\$49.91

The wire and silicon steel were used for building a transformer to supply the filaments and plate current for the tubes. The set may either be self-rectifying or an electrolytic rectifier may be used with choke coils and condensers for the smoothing out circuit, such as used by Dunnam at 3AAO.

I have a motor-boat coll, the secondaries of which are wound with No. 37 enameled wire. These will act as choke coils. I will make a core for each, using the silicon steel for this purpose. The secondaries of a quarter inch spark coil will do just as well. The electrolytic rectifier may be made from sheets of lead and aluminum, suspended in jelly glasses. The solution can be of either ammonium phosphate or a saturated solution of borax and water. The electrolytic condenser is constructed of aluminum about ¼ inch thick. Two plates are suspended in small jars containing a solution of ammonium phosphate or borax. The above apparatus covers the "Incidentals" listed in the price column above.

The silicon steel is also for a transformer core. Cut it to a size of 5 inches square on the outside and 2 inches square for the inside with 1 inch by 1½ inch cross section. The primary will require 458 turns of No. 20 SCC wire. The filament winding consists of 34 turns of No. 14 DCC wire. The plate circuit will require two windings, each of 1500 turns of No. 30 wire.

A good 23 plate condenser may be used for tuning. The construction cost can be still further reduced by substituting 7-22 stranded phosphor bronze wire for the copper tubing. If an ammeter is required for the antenna circuit the construction cost will be increased by \$6. A couple of small spark coils for the chokes can be obtained from practically any automobile repair shop.

tion, Mr. Lindsay, is to send the dope to the editor of this page. We'll put it in shape for you, and everybody in the U.S. will know about 6ALE.

The following letter is published for the purpose of showing our readers the wide scope of "Pacific Radio News."

TRANSLATION FROM THE FRENCH.

RAOUL MOHA

Electrician—Radiotelegrapher, Member of the French Society for the Study of Radio.

Mr. Raoul Moha sends his best 73's to the Manager of the Pacific Radio Supplies Co., for the address of which he is indebted to that fine magazine, Pacific Radio News. On the strength of this advertisement he earnestly beseeches that he be sent a free sample, without duty, of the A-P Rectifying tube, said tube to be used to change 110 volts 50 cycles to 350 volts direct current.

He also wishes information on sockets for these tubes, as well as data on the primary and secondary of the step-up transformer required; likewise data on the inductances required for filtering the output of the rectifiers. In all the foregoing give the sizes of the wires, the thickness of the sheets, and the dimensions of the magnetic circuits.

(Signed)

Thanks in advance,

R. MOHA.



WITH THE RADIO INSPECTOR

This department is conducted by the Radio Inspector of the Sixth District. Questions are answered free of charge. Your name will not be published. Initial your letters only.

Send Your Questions to: Radio Inspector's Dept. "Pacific Radio News"

September 1, 1921.

Editor Pacific Radio News,
San Francisco, Calif.

Dear Sir:

It has come to my attention that many amateurs are breaking the U. S. radio laws, both as regards to power and to wave length.

One evening recently I heard a station start up, and call another nearby to ask on what wave he was sending, showing that he had no idea himself whether his apparatus was adjusted to comply with the requirements of the law. I checked this party, and found that he was on about 260 meters. The station with whom he was working came back at him, and told him that he was OK, and on 200, which shows how very accurate (?) such a practice is.

This appears to be a common custom among many amateurs, although they do not realize that they are breaking the law by so doing. The only safe and proper way to tune a transmitter is to use a wavemeter (strange to say), whose extreme simplicity is usually not recognized by the majority of amateurs. A small variable condenser, with about a 25 turn inductance coil, such as a honeycomb, with the addition of a crystal detector, makes a wavemeter of fair efficiency, with a pair of telephone receivers to indicate resonance. There is nothing difficult about that, certainly, and in most cases all of these instruments can be found around even the smallest amateur station. The calibration of the instrument is a puzzle to most, however, but even this can be done very simply, by comparison with a standard instrument. The meters of this department are available for this purpose whenever amateurs wish to avail themselves of the privilege, for which service there is no charge.

Another evening I measured the waves of eight stations, all within a period of about a half an hour, and of the eight, seven were transmitting on wave lengths in excess of 200 meters, and one of these was on about 280 meters. Proper action was taken in all cases.

In spite of repeated warnings, there still seems to be a large number of amateurs who do not know that the law requires a reduction of power when working with nearby stations. The law states that "a minimum of power necessary to insure safe communication" shall be used at all times. According to some of the signals I have heard, it seems that a half kilowatt is needed to insure safe (?) communication over a distance of a few miles, in many cases, and a large number of stations seem to work with this efficiency (?) all the time. Amateurs may be interested to know that if detected, this will constitute sufficient evidence for the suspension, or even the possible cancellation of their licenses.

Respectfully,

D. B. McGOWN,
Assistant Radio Inspector,
U. S. Dept. of Commerce.

Questions Answered BY THE Radio Inspector

Q.—When a commercial operator's license is suspended does he lose the usual 20 per cent credit when applying for a renewal of the suspended license after it expires? (L. C., San Francisco.)

Ans. No, although he will not be allowed to apply for re-examination until the suspension period is over. Whether or not he may apply for a license of higher grade than he holds will also be given consideration, in connection with the suspension, when he apply for a new license.

Q.—In your estimation, what is the best formula for calculating the natural period of an aerial when its length, number of wires, etc. are known? (C. J., Alameda, Cal.)

Ans. The best formula to use to get the natural period of an antenna is to MEASURE IT. There is no formula that is accurate. The old system of multiplying the mechanical length of the antenna system by 4.5 gives a rough approximation, although it is at best very inaccurate. One with experience can usually judge the natural period almost as well as it can be calculated by ordinary means. So many factors, such as nearby metallic objects, sag of wires, etc., enter into the matter that it is almost impossible to calculate it exactly.

Q.—Can you briefly tell me what new radio agreements were made at the recent radio communication conference in Europe? (K. M., Oakland.)

Ans. No definite data yet received on this matter.

Q.—Will it be possible for the Radio Inspector's office to inform me whether a Canadian license operator can secure employment legally at a U. S. land station if he passes the U. S. commercial examination? (A. DeC., Victoria.)

Ans. According to the U. S. Radio Laws a Canadian, or any foreigner, may operate a U. S. Radio Station, either ship or land, provided he has a valid commercial license of the grade required for the station at which he desires to operate.

Q.—After reading the editorial in the September issue of "Pacific Radio News" in which the editor states that unlicensed stations should be warned in person by local amateurs before being reported to the Radio Inspector, I would like to ask if the editor is correct in this statement. Should not the Radio Inspector be notified at once in order to have the law enforced? (B. F., Pasadena, Cal.)

Ans. In most cases it will be found that the offender operating unlawfully is doing so without knowledge of the laws he is breaking, and a word from someone interested will usually serve as sufficient warning, and will cause the guilty person to obey the law, although the Radio Inspector's office should also be notified.

Q.—I desire to install C. W. transmitters in Nevada to communicate between various offices of a certain company in that state. We will handle business pertaining to the company only. Can these stations be licensed under the amateur class or must they be commercially licensed and have commercial men to operate them? No paid business will be handled. (C. N., Nevada.)

Ans. They must be licensed as limited commercial, which will restrict them to operation between the stations of the company, on certain specified wavelengths designated on the license. They will not be allowed to communicate with any other stations, under these licenses, except in emergencies. If it is found that the effect of their radiated energy reaches the coast, they must be classed as "coastal" stations, and at least commercial second class licensed operators will be required. If they are classed as "inland" stations the class of operators will be designated in the license, when issued. Suggest that you write to the Radio Inspector's Office, 215 Custom House, San Francisco, Calif., for further information.

Q.—Why are there no women operators employed at land stations? I have heard that the government regulations do not permit their employment as ship operators, but does this also apply to land stations? (Mrs. S., San Francisco.)

Ans. No restrictions are placed on the sex of applicants for radio license, nor on where they may be employed. It is understood, however, that there is little, if any opening for women at any radio stations. This office has no record of any women being employed at any radio stations, either ship or shore.

Q.—I have read much about transmitting with an ordinary buzzer and learn that it can work several miles under good conditions. Must such a miniature device be licensed in order to be allowed to operate, especially where it may be situated in a remote part of the state? (A. D., Sacramento, Cal.)

Ans. Yes. This station MAY INTERFERE with the reception of signals or radiograms the origin of which is beyond the state, and therefore such a station must be licensed.

Q.—When the Department of Commerce confiscates an amateur's equipment does the amateur have it returned to him when his license for operating the station expires? (G. D., San Diego, Cal.)

Ans. According to law, confiscated apparatus becomes property of the government, and will not be returned to the former owner at any time. Apparatus

One Little Word:

RADIO

with a big meaning—
It's the new name of the "PRN." Don't forget it!

SEIZED, during the war, by the navy department, may be returned to the owner, upon application to the District Communication Superintendent, of the Naval District in which the seizure was made although it is believed that most of this apparatus is already in the hands of its proper owners.

Q.—I have a small radio telephone set. Can I play music for the benefit of other amateurs? (A. M. B., San Francisco.)

Ans. No. Concerts must only be sent out by certain stations designated for that purpose by the Radio Inspector, at designated times. If anyone was allowed to send them out promiscuously, it would cause endless interference, and trouble, as well as monopolization of the "circuit" by one party to the exclusion of all others.

EXAMINATION FOR RADIO INSPECTOR

The United States Civil Service Commission announces an open competitive examination for radio inspector on October 5, 1921. Vacancies in the positions of radio inspector and assistant radio inspector in the Bureau of Navigation, Department of Commerce, at \$1,800 to \$2,200 a year, and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion. The duties will be primarily to inspect the radio apparatus on steamships, to insure its compliance with the law, and to inspect shore stations. The inspectors may also be called upon to examine radio operators. The duties of radio inspectors require some office experience, therefore competitors should outline fully in their applications any office experience they may have had. Competitors will be examined on theoretical and practical questions in the construction, use, and adjustment of radio apparatus and auxiliaries (rating of 50) and education and experience in the line of the required duties (rating of 50).

Applicants must have received a bachelor of science degree from a school of recognized standing, such educational training to have included a special course in radio or kindred sciences, or show that they are senior students in such institutions; or have had the equivalent of a high school education and at least two years' experience in special radio work, such as the manufacture, installation, or adjustment of commercial or governmental wireless apparatus. It is essential that applicants be wireless telegraph operators.

Applicants must have reached their twenty-first but not their fiftieth birthday on the date of the examination. These age limits do not apply to persons entitled to preference because of military or naval service.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C., or to the Secretary of the United States Civil Service Board at any place listed hereon. Applications should be properly executed, excluding the medical and county officer's certificates, and filed with the Commission at Washington in time to arrange for the examination at the place selected by the applicant.

CALL LIST OMISSIONS

The list of Pacific Coast amateur stations in our September issue did not contain the name and address of station 6AQQ. In order to complete last month's list our readers should include the following: 6AQQ, A. H. Furst, 843 East Central Ave., Redlands, Cal.

Sixth District Amateur Stations

Call	Name—	Address—
6ASN	D. Koch	2043 Berryman Street, Berkeley, Cal.
6ASO	J. P. Hickey	149 Sixth Avenue, San Francisco, Cal.
6ASP	C. F. Lard	5815 Ayala Street, Oakland, Cal.
6ASQ	F. J. McLung	302 South Rugby St., Huntington Park, Cal.
6ASR	Wan Chan Chock	Beretania St., Honolulu, T. H.
6AST	R. F. Legge	3016 Benvenue Avenue, Berkeley, Cal.
6ASU	E. Sibbett	13 Parkside Drive, Alameda, Cal.
6ASV	D. G. Chilson	Tucson, Ariz.
6ASW	I. Coffey	Gonzales, Cal.
6ASX	A. W. Williford	3265 Central Avenue, Alameda, Cal.
6ASY	R. H. Plimpton	2508½ Palm Drive, Los Angeles, Cal.
6ASZ	E. S. Graham	1189 Dolores Street, San Francisco, Cal.
6ATA	A. & L. Newman	1700 Sonoma Ave., Berkeley, Cal. (Portable.)
6ATB	P. Langrick	510 North Lake Street, Los Angeles, Cal.
6ATC	K. W. Kent	53 Hernandez Avenue, Los Gatos, Cal.
6ATD	J. R. Casey	Auburn, Cal.
6ATE	H. Adams	1238 S. Ninth East St., Salt Lake City, Utah.
6ATF	W. B. Bruce	139 South Walnut Street, Brea, Cal.
6ATG	R. Robinson	520 Rose Avenue, Long Beach, Cal.
6ATH	M. E. Johnson	1 East Second St., Ephraim, Utah.
6ATI	A. Watson	1204 H Street, Eureka, Cal.
6ATJ	F. Nickson Jr.	416 Sixth Street, Petaluma, Cal.
6ATK	H. Hammerly	529 Merrinac St., San Francisco. (Portable.)
6ATL	H. L. McIntosh	312 East Mill Street, Santa Maria, Cal.
6ATM	D. Likes	137 Richards Street, Fallon, Nev.
6ATN	M. E. Stuart	Fallon, Nev.
6ATO	E. G. Bowman & T. F. Holmes	Thacher School, Ojai, Calif.
6ATP	O. White	Nogales, Ariz.
6ATQ	H. A. Wall	Mt. Pleasant, Utah.
6ATR	C. Urquhart	403 E St., Eureka, Calif.
6ATS	R. Fludge	19th Ave. & Sloat Blvd., San Francisco.
6ATT	Pomona Fix. & Wir. Co.	Pomona, Calif.
6ATU	C. Henninger	R. F. D. 1-4-215-J, Oakland, Calif.
6ATV	John Utachig	1468 Ninth Ave., San Francisco.
6ATW	J. Eliassen	317 Ramona Ave., Berkeley, Calif.
6ATX	H. C. Gregory	Vendime Ave., Daly City, Calif.
6ATY	T. L. Graham	1189 Dolores St., San Francisco.
6ATZ	G. Evans	3042 Delaware St., Oakland, Calif.
6AUA	L. Ziegler	4601 Pasadena Ave., Los Angeles, Calif.
6AUB	H. Compton	3369 28th St., San Diego, Calif.
6AUC	H. Hostetter	3754 Oregon St., San Diego, Calif.
6AUD	J. Elmer	2020 Monroe Ave., San Diego, Calif.
6AUE	M. D. Ball	1168 22nd St., San Diego, Calif.
6AUF	J. F. Thomas	St. Joseph High School, San Jose, Calif.
6AUG	H. Vettel	Hornbrook, Calif.
6AUH	D. Bergstedt	Magnolia Ave., Pasadena, Calif.
6AUI	F. W. Robinson	903 Pine St., Oroville, Calif.
6AUJ	P. Peterson	1213 E. Wash. St., Phoenix, Ariz.
6AUK	A. Burley	Newcastle, Calif.
6AUL	H. O. DeLa Montanya	2830 11th Ave., Oakland, Calif.
6AUM	C. H. Romander	Smith River, Calif.
6AUN	C. A. Messineo	1730 Page St., San Francisco.
6AUO	J. J. Wallace	831 Sacramento St., Vallejo, Calif.
6AUP	J. F. Brady	2012 Pacific St., Alameda, Calif.
6AUQ	R. M. Heintz	653 Miramar Ave., San Francisco.
6AUR	W. A. Carlson	1710 34th Ave., Oakland, Calif.
6AUS	E. E. Vetter	912 Persia Ave., San Francisco.
6AUT	R. E. Eparza	1915 Lincoln Ave., Alameda, Calif.
6AUU	H. A. Tattenham	316 Richland Ave., San Francisco.
6AUV	E. T. Cole	116 Florida St., Vallejo, Calif.
6AUW	R. Ghidella	2051 Leavenworth St., San Francisco.
6AUX	R. H. Hanlon	437 Walnut St., San Francisco.
6AUZ	R. Moore	2612 Buena Vista Ave., Alameda, Calif.
6AVA	E. M. Hall	931 61st St., Oakland, Calif.
6AVB	G. Deaner	154 J St., Tulare, Calif.
6AVC	C. A. Pearson	2323 F St., Sacramento, Calif.
6AVD	J. M. Boyd	Twelfth & Market Sts., Oakland, Calif.
6AVE	J. R. Alsip	R. F. D. No. 3, Box 735, Watts, Calif.
6AVF	J. C. Graner	1121 Santa Clara St., Vallejo, Calif.
6AVG	J. H. Hadley	1190 Jackson St., San Francisco.
6AVH	R. Winenow	269 Richland Ave., San Francisco.
6AVI	R. Richardson	4358 Foothill Blvd., Oakland, Calif.
6AVJ	L. C. Cole	753 E. Third St., Los Angeles, Calif.
6AVK	M. S. Wood	483 L St., Dinuba, Calif.
6AVL	H. V. Rugh Jr.	2425 Alhambra Ave., Alhambra, Calif.
6AVM	F. L. Walker Jr.	Westwood, Lassen Co., Calif.
6AVN	R. Zimmerman	Capay, Calif.
6AVO	T. Shaw	150 W. Third St., Claremont, Calif.
6AVP	B. McMahon	Compton, Calif.
6AVQ	E. E. Barnett	548 W. Sixth St., Long Beach, Calif.
6AVR	H. Knagh	250 Thrift St., San Francisco.
6AVS	C. Yates	R. F. D. No. 3, Box 104A, Fullerton, Calif.
6AVT	H. Norek	506 Orange Ave., Long Beach, Calif.
6AVU	H. Frame	2533 Brant St., San Diego, Calif.
6AVV	K. Lambkin	114 Bonito Court, Ontario, Calif.
6AVW	M. Ports	3265 Belmont St., Fresno, Calif.
6AVX	R. Garcia	1003 N. Coronado St., Los Angeles, Calif.
6AVY	G. G. Monck	2330 Third St., San Diego, Calif.
6AVZ	L. P. Simpson	1040 W. 51st Place, Los Angeles, Calif.
6AWA	W. J. Edwards	2221 Hunt St., Monterey, Calif.
6AWB	P. H. Adams	756 E. Avenue, Coronado, Calif.
6AWC	J. H. Smith	320 Milford St., Glendale, Calif.
6AWD	G. C. Callender	139 Jessie St., Manteca, Calif.
6AWE	E. Owen	2302 Garfield St., Monterey Park, Calif.
6AWF	H. C. Rider	933 N. Harvard Blvd., Los Angeles, Calif.
6AWG	A. Chamberlain	106 W. Third St., Los Angeles, Calif.
6AWH	R. Squire	39 Granada St., San Francisco.
6AWI	E. J. Seely	540 So. 9th East St., Salt Lake City, Utah.
6AWJ	N. S. Beesley	1917 Raymond Ave., Los Angeles, Calif.
6AWK	S. W. Lohman	4408 Santa Monica Blvd., Los Angeles, Calif.
6AWL	B. Fredenthal	527 Euclid Ave., Ontario, Calif.
6AWM	W. Weitman	2424 Sixth Ave., Los Angeles, Calif.
6AWN	F. W. Wood	1413 Malvern St., Los Angeles, Calif.
6AWO	A. E. Moorhead Jr.	284 Perkins St., Oakland, Calif.
6AWP	W. Phillips	905 York St., Vallejo, Calif.
6AWQ	F. Thacher	407 W. First St., Santa Ana, Calif.
6AWR	F. W. Hadley	San Simeon, Calif.
6AWS	D. G. Hewitt	Box 596, Stanford University, Calif.
6AWT	H. D. Schmidt	383 Ocean Ave., Santa Cruz, Calif.
6AWU	B. Mollinari	653 Union St., San Francisco, Calif.
6AWV	W. Stonerook	3702 Utah St., San Diego, Calif.
	C. H. Weatherhill	1509 G St., Reedley, Calif.

Seventh District Amateur Stations

CORRESPONDENCE FROM OUR READERS

Call.	Address.	Name.
70A	William Thurlow	300 N Street, Hoquiam, Wash.
70B	Arthur Hagerman	Y. M. C. A., Baker, Ore.
70C	H. H. Clark	599 Pershing St., Portland, Ore.
70D	M. B. McBride Jr.	1031 N. 23rd St., Seattle, Wash.
70E	H. S. Pyle	810 Warren Ave., Bremerton, Wash.
70F	V. C. Johnson	1014 Glass Ave., Spokane, Wash.
70G	E. A. Elge	418 N. Benton St., Helena, Montana.
70H	G. S. Felkert	402 N. 17th St., Corvallis, Ore.
70I	P. M. Smith	R. F. D. No. 3, Powell, Wyo.
70J	L. U. Bennett	Port Townsend, Wash.
70K	Frederick Koelsch	103 Jefferson St., Boise, Idaho.
70L	Roy Smith	202 First Street South, Burley, Idaho.
70M	Harold Woodyard	Sunnyside, Wash.
70N	Sheldon Hagen	807 24th Ave., Seattle, Wash.
70O	G. O. Leonard	1827 Fourth Ave. W., Seattle, Wash.
70P	H. E. Williamson	316 Union St., Seattle, Wash.
70Q	R. E. Peratovich	Bay View, Alaska.
70R	A. H. Lillibridge	506 E. A St., Moscow, Idaho.
70S	C. F. Burdick	Casper, Wyo.
70T	B. B. Bliss Jr.	417 Bannock St., Boise, Idaho.
70U	W. K. Stockdale	Prosser, Wash.
70V	F. J. Campbell	Second St. N., Forest Grove, Ore.
70W	Edwin Eby	782 Front St., Salem, Ore.
70X	W. A. Hazelwood	Myrtle Point, Ore.
70Y	J. R. Truman	848 Ocean Drive, Bandon, Ore.
70Z	Garrett Lewis	767 Hawthorne Ave., Portland, Ore.
7PA	H. W. Randall	1212 Stark St., Pullman, Wash.
7PB	R. T. Jones	116 Edison St., Portland, Ore.
7PC	Herbert Chase	2010 Water St., Olympia, Wash.
7PD	B. C. Hendricks	Cornellus, Ore.
7PE	L. C. Grove	Kenai, Alaska.
7PF	Glen Goudie	2818 Victor Place, Everett, Wash.
7PG	K. H. Ellerbeck	2019 Nob Hill, Seattle, Wash.
7PH	R. M. Gardner	R. A. Box 202A, Eugene, Ore.
7PI	R. K. Moore	115 First St., Wolf Point, Mont.
7PJ	D. P. Scaife	288 Elghth St., Marshfield, Ore.
7PK	D. K. Boyd	Second Ave., Glasgow, Mont.
7PL	C. H. Ackerman	305 Fifth St. S., Glasgow, Mont.
7PM	H. C. Manning	4324 8th Ave. N. E., Seattle, Wash.
7PN	B. L. Davis	8523 12th Ave. N. W., Seattle, Wash.
7PO	G. E. Kinsey	907 W. 58th St., Seattle, Wash.
7PP	Stadium High School	First and E St., Tacoma, Wash.
7PQ	Arthur Harding	1120 N. 9th St., Seattle, Wash.
7PR	Leland Harris	3232 38th Ave. S. W., Seattle, Wash.
7PS	Arthur Randall	2802 22nd Ave., Seattle, Wash.
7PT	E. P. Coulter	529 Third St., Helena, Mont.
7PU	E. L. Hansen	R. F. D. No. 2, Powell, Wyo.
7PV	J. M. Dickenson	434 17th St., Corvallis, Ore.
7PW	C. W. Gabrielson	Puyallup, Wash.
7PX	L. A. Kobe	Powell, Wyo.
7PY	Hans Waale	Nampa, Idaho.
7PZ	Walter Bone	Carneyville, Wyo.
7QA	H. M. Hassell	120 E. 60th St., Seattle, Wash.
7QB	Kenneth Field	306 E. Olive St., Seattle, Wash.
7QC	J. F. Bunting	1907 1st Ave. W., Seattle, Wash.
7QD	D. H. Bunch	1015 Spur St., Aberdeen, Wash.
7QE	W. H. Motz	4608 J St., Tacoma, Wash.
7QF	S. W. Ostrom	4840 48th St. S. E., Portland, Ore.
7QG	G. R. Salisbury	1951 Third Ave. W., Seattle, Wash.
7QH	H. M. Reynolds	3817 Densmore Ave., Seattle, Wash.
7QI	J. D. Keating	1315 Sandy Blvd., Portland, Ore.
7QJ	Frederick Lindstrom	Powell, Wyo.
7QK	R. R. Patrick	Eastonville, Wash.
7QL	Alva Flippin	Rainier, Ore.
7QM	R. E. Welch	1005 N. Normandle St., Spokane, Wash.
7QN	A. Z. Lillian	620 21st Ave. N., Seattle, Wash.
7QO	J. C. Mitchell	1622 Mellrose Ave., Seattle, Wash.
7QP	Howard Liebe	204 N. 22nd St., Portland, Ore.
7QQ	Chris Engleman Jr.	321 W. 32nd St., Vancouver, Wash.
7QR	C. V. Annin	Myrtle Point, Ore.
7QS	E. W. Henry	5505 36th Ave. S. E., Portland, Ore.
7QT	Clarence Hurd	1514 Willamette St., Eugene, Ore.
7QU	F. R. Cartan	1461 Monroe St., Corvallis, Ore.
7QV	John Munzenrieder	515 First St., Helena, Mont.
7QW	Jay Isham	320 Dalton Ave. W., Spokane, Wash.
7QX	F. A. Koehler	314 S. 12th St., Corvallis, Ore.
7QY	Victor Chambers	Nineteenth St., Cottage Grove, Ore.
7QZ	D. W. Cathcart	1505 E. 66th St., Portland, Ore.
7RA	M. A. Hauge	5635 11th Ave. N. E., Seattle, Wash.
7RB	R. G. Farrah	700 E. 26th St., Vancouver, Wash.
7RC	Barton Stanler	Spruce St., Myrtle Point, Ore.
7RD	Charles Parmelee	Sunnyside, Wash.
7RE	N. H. Foster	N. Water St., Ellensburg, Wash.
7RF	H. E. Nelson	Centralia, Wash.
7RG	E. J. Hoff	927 Irving St., Astoria, Ore.
7RH	P. E. Nolte	Camp Lewis, Wash.
7RI	John Soderstrom	823 Thornton St., Aberdeen, Wash.
7RJ	G. O. Campbell	2443 Fifth Ave. W., Seattle, Wash.
7RK	H. L. Haven	1123 Burwell St., Bremerton, Wash.
7RL	G. W. Garman	1566 31st Ave. S., Seattle, Wash.
7RM	H. A. Burgess	9260 California Ave., Seattle, Wash.
7RN	Kenneth Paton	Cashmere, Wash.
7RO	R. G. Heltkemper	439 E. 10th St. N., Portland, Ore.
7RP	E. R. Simpson	1004 Leonard St., Portland, Ore.
7RQ	D. E. Renlokke	Cashmere, Wash.
7RR	Jeffery Kilchli	319 N. 33rd St., Billings, Mont.
7RS	L. E. Scriven	2118 Lingerwood St., Spokane, Wash.
7RT	E. S. Callies	2815 Pacific Ave., Hoquiam, Wash.
7RU	N. J. Bruck	744 Kearny St., Portland, Ore.
7RV	Wm. Morton	6523 45th Ave. S. E., Portland, Ore.
7RW	D. E. Schultz	2423 Birch St., Astoria, Ore.
7RX	L. F. Shields	Box 21, R. F. D. No. 1, Salem, Ore.
7RY	L. F. Zimmerman	Owyhee St., Ontario, Ore.
7RZ	V. B. McCulloch	323 N. Conant Ave., Burley, Idaho.

Walnut Grove, Cal.,
August 9, 1921.

Editor, "PRN,"
151 Minna St.,
San Francisco, Cal.

Dear Sir:

Just thought I would listen-in during the early morning hours to see what has been doing on the air. To say the least, it is certainly surprising to hear what was done through the heavy interference.

A few nights ago 6EA of Los Angeles gave a message to 7DA (now 7ZT) direct and a QSL of an OK was received right off the bat. A few minutes later 6EB of Los Angeles also worked 7DA. The interference was heavy at the time and kept me jumping in an endeavor to get both stations. The distance is about 900 miles by air line from 6EA to 7ZT.

Then 6AJH exchanged greetings with 7ZJ through heavy atmospherics. The San Diego arc spoiled the fine work of the morning hours.

While writing you this letter, I am listening to 6MH working with 7ZJ and they don't seem to be having much of a hard time in doing so. In this case the distance is another 900 miles and I hear two other fellows working at the same time, all of which goes to show that much work is being accomplished during the early morning hours.

All of the stations mentioned above are spark equipped. I am situated just half way between these stations and have, therefore, a fine chance to get an idea of what is going on from all directions.

Respectfully,

(Signed) J. W. WISE, 6ZX.

310 West 14th Street,
New York City,
Sept. 1, 1921.

Editor "Pacific Radio News,"
Pacific Radio Publishing Co.,
San Francisco.

My Dear Editor:

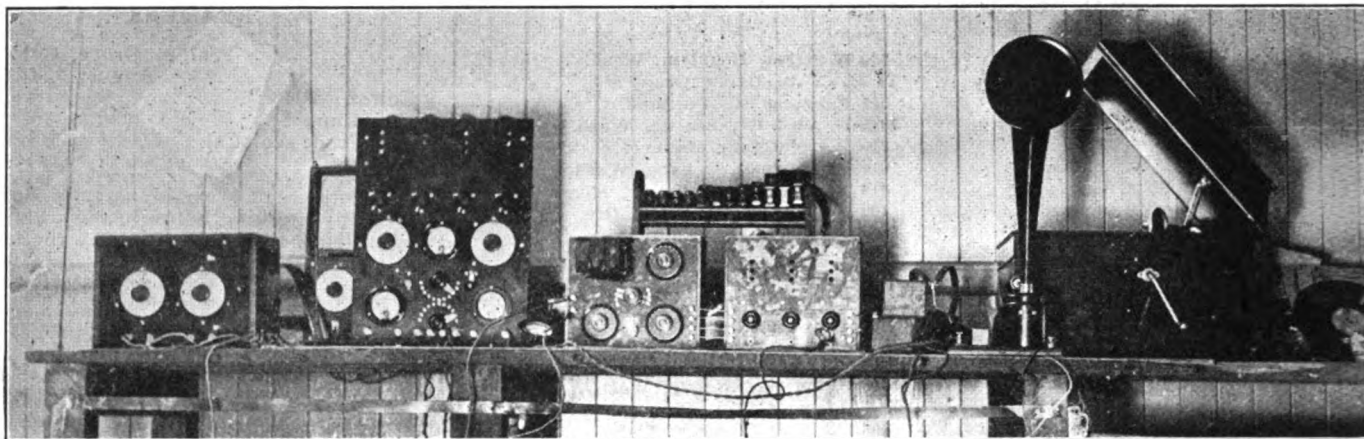
I read with much interest an article by Mr. Carl E. Soderstrom in the September issue of P.R.N., in which he states his views concerning private apparatus aboard merchant vessels. I heartily agree with Mr. Soderstrom in some of his views, but on the other hand I believe it is an injustice to the operators en large, that some should use or be permitted to use a sensitive detector and amplifier (vacuum tubes) while others dare not, owing to existing regulations.

I understand that the shipping board permits the use of vacuum tubes, and I know that various foreign vessels are using vacuum tubes in their regular equipment. I consider it unfair to those who must use the regular equipment, that is, crystal detectors, although the latter can get traffic through just as well with a little more patience.

In this connection I would like to call Mr. Soderstrom's attention to his letter of October 8, 1920, printed on page 81 of the November, 1920, issue of P.R.N., in which he reports hearing San Diego press 4,000 miles in daylight and Annapolis and Balboa while at London, using a Kennedy Long Wave Receiver outfit with one audiotron bulb. If the above performances don't contradict every reason Mr. Soderstrom gave for not using private apparatus aboard merchant vessels, I'd like to know—"How Come?"

Yours very truly,

(Signed) MONTE COHEN.



Radio Telephone Shop Concert Set.

RADIO TELEPHONE SHOP CONCERT SET

Every Tuesday and Friday night from 8 to 9 you have heard the radio telephone concerts broadcasted from the Radio Telephone Shop in San Francisco, but you have never had the "inside dope" of 6UV. The picture tells the whole tale. The more you look at it the more you will learn about the "TRTS" station.

Mr. A. F. Pendleton, proprietor of the Radio Telephone Shop, personally operates the station twice weekly for the benefit of the many hundreds of "listening-in" radio fans along the Pacific Coast. Radio concerts, exclusively, are broadcasted on 425 meters and reports of the reception of music have been reported from stations as far north as Seattle, Wash. Ships at sea have heard Mr. Pendleton's voice while 800 miles from San Francisco.

The main radio transmitter panel can be seen to the left of the picture. Four power tubes of the 5-watt size are used. The antenna for radio telephone transmission is hardly 50 feet above the ground. To the right of the telephone transmitter panel is the receiving equipment. The two units are of the Pen Brand Type A detector and two stages of amplification are used for receiving purposes. The Magnavox does the rest. A Columbia phonograph and a generous supply of the latest records were loaned to the Radio Telephone Shop for the musical program.

Mr. Pendleton is one of the radio telephone pioneers of the West. His first telephone made its debut on the air about

a year and a half ago. At that time radio concerts were a distinct novelty and to Mr. Pendleton goes much of the credit of being the "founder" of the local air concerts.

The station is specially licensed by the Department of Commerce for experimental work. It is located close to the San Francisco water front, on Steuart Street. Several of the large commercial radio companies have branch offices on that same street and this familiar by-way of the commercial operators has taken on the nickname of "Radio Row."

NORTHWESTERN C.W. STATION WORKS ALASKA ON ONE TUBE

The following letter is from Nelson Lagoon, Alaska. It was sent to 7OZ, telling him of the fine work that he is doing with his C.W. set, using only one 5-watt bulb and A.C. for the plate voltage.

Nelson Lagoon, Alaska, July 6, 1921.
Garrett Lewis,
Radio 7OZ,
Dear Friend Lewis:

It would probably interest you to know that your C.W. signals were heard with good audibility at Libbyville, up in Bristol Bay, Alaska.

John Hertz, old 7ZB, was the boy who heard you. He did not make notation of the exact date, but it was about the 11th of June. He also has heard 7BX's spark, as well as several "six" stations.

73 and C. U. L.
(Signed) RALPH WILLISON, 7BP.

7YA—BOISE, IDAHO

We have often wondered what 7YA looks like, as we all have heard him. Here's all the important dope, including photos, of the Boise station that is mentioned on the air almost every night from one end of the coast to the other.

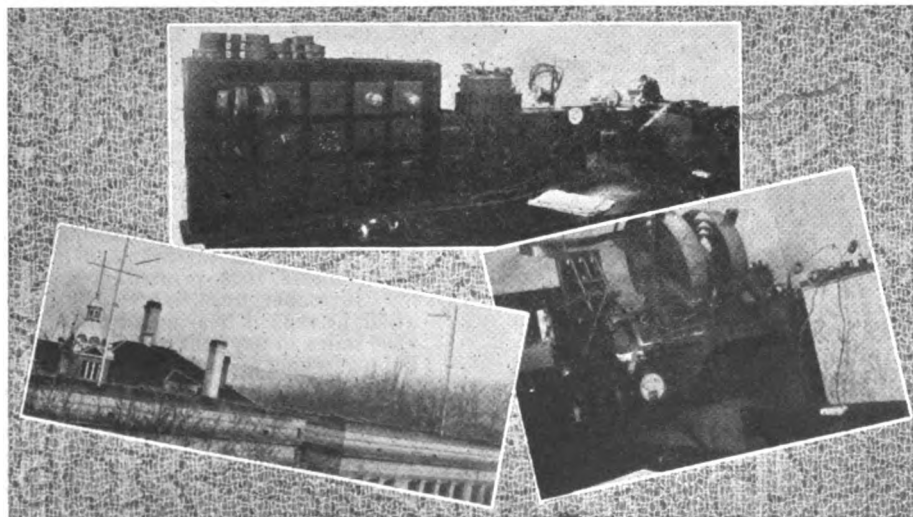
7YA is located in the Boise High School and has been shut down at times during the summer vacation. More than 100 cards were received during January from various stations hearing 7YA—so many, in fact, that H. E. Redeker, the station operator, experienced difficulty in answering them all. Mr. Redeker is an instructor at the school and is assisted in the work of the station by E. O. Selby, a student operator.

The aerial is clearly shown in one of the photos. Two masts, 45 feet high, mounted on the roof of the school, suspend an aerial 125 feet long. Another aerial about 115 feet long of the inverted L type is also used. The lead-in is a length of No. 4 copper wire, 55 feet long. Four No. 10 insulated copper wires soldered to the water pipes in the building are used for the grounding system.

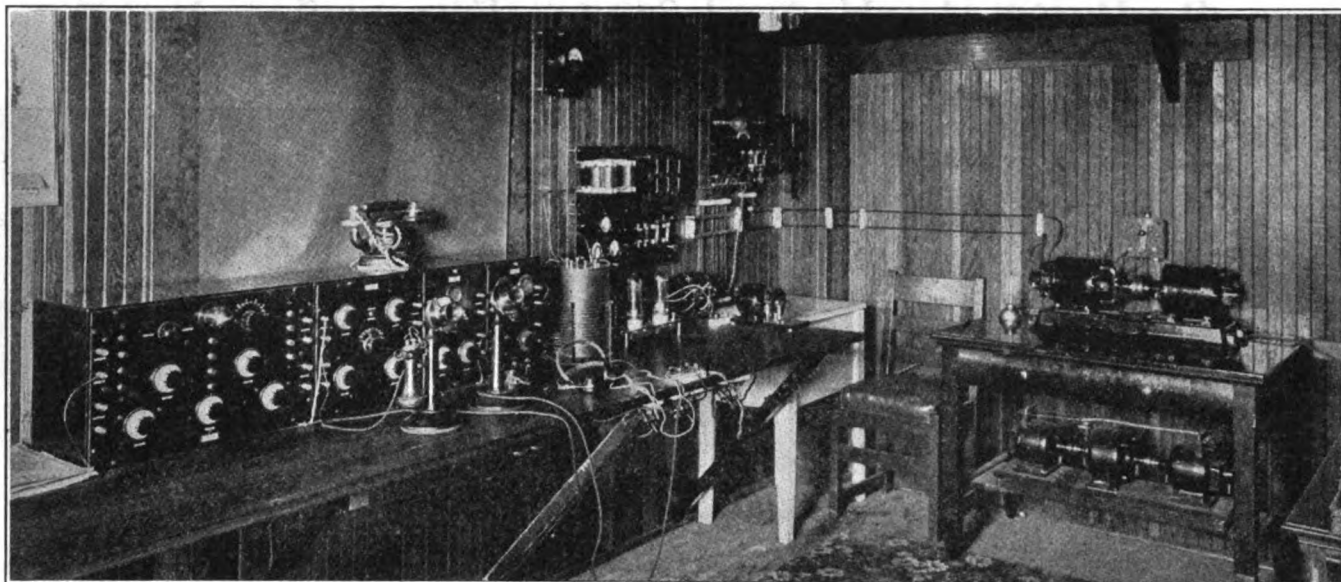
These pipes lie directly under the aerial and act somewhat like a counterpoise. The fundamental wave length of the transmitting aerial is 375 meters. A 2 k.w. oil-immersed transformer, closed core magnetic leakage type, formerly used by H. A. Rawson of Kuna, Idaho, is responsible for the QSA juice that 7YA shoots into the air. The transformer was built by the General Electric Company according to Mr. Rawson's specifications. The condenser is also oil-immersed. It has 6 x 8-inch copper plates, each plate being separated by three sheets of 8 x 10-inch photographic glass.

The gap is the heavy Meteor type, provided with variable speed control. The O.T. is a "DX-52" with 3-inch copper ribbon on both the primary and secondary windings. The radiation on 1 k.w. is almost 7½ amps, according to readings obtained from a Jewell thermo-coupler ammeter. A DeForest unit panel receiver was used throughout the last season.

The greatest official working distance of 7YA is with 9NJ, Ames, Iowa. Signals have also been heard at Madison, Wis., and with generally good audibility within a radius of 1000 miles. A station at Riverside, Cal., reports signals from 7YA strong on a crystal detector and a ship station stated that 7YA could be heard "all over the cabin" while the vessel was more than 1000 miles northwest of Seattle.



7YA—Boise, Idaho.



Kennedy Telephone Station at Los Altos.

KENNEDY RADIO TELEPHONE TRANSMITTING STATION

Among the radio telephone installations on the Pacific Coast, that of the Colin B. Kennedy Company of San Francisco has been exciting a great amount of interest and comment, due both to its excellent modulation and to the distances over which transmission has been successfully achieved.

The Kennedy experimental station, whose call is 6XAC, is at Los Altos, about 40 miles south of San Francisco on the peninsula and on the inland side of the coast range. The installation is at the home of Emile A. Portal of that company, who is responsible for the operation of the station.

The photograph which is reproduced herewith shows the interior of 6XAC with the exception of the phonograph used for transmitting music, which is at the right. The receiving equipment is shown at the left and consists of the following old-type Kennedy units, a Type 100 long wave receiver, a Type 200 short wave receiver, a Type 300 audion control panel, and a Type 520 two-stage amplifier. Mr. Portal states that he expects to replace all of this in the near future with two of the new receiving units recently developed by his company—a Type 110 universal receiver and a Type 525 two-stage amplifier. A Magnavox and two-stage Magnavox power amplifier complete the receiving equipment with which Mr. Portal has at various times entertained his neighbors within a radius of from three to four miles, as previously recorded in these columns.

The transmitting equipment, as is indicated by the picture, is extremely simple. Two 50-watt Cunningham tubes are used, one as modulator, the other as oscillator. The filaments are heated by current drawn directly from the 10-volt secondary of a 60-cycle transformer having a neutral point. The plate current is supplied by the 1000-volt generator of the 275-watt motor generator outfit shown on the table at the right. Double choke coils and fixed condensers are used in smoothing out the commutator ripple. A modulation transformer of special design is employed in connection with a high duty telephone transmitter for voice and a Magnavox tone arm transmitter for the music. The necessary meters are mounted conveniently on panels for the

observation of the different variable quantities of voltage and current. The normal radiation of the station is three amperes.

The circuits and constants used are developments of the Kennedy laboratory and will be made public at a later date.

The antenna used for transmitting is of the cage type 55 feet long and about 100 feet high. Two other single wire antennas are available for reception when desired.

6XAC transmits music three times a week, on Monday and Thursday evenings between 8 and 9 o'clock, and on Sunday afternoons from 3 to 4. The wave length is 430 meters.

In the short time that this station has been operating some very interesting reports of its reception have been received. Excellent reception on a single tube has been reported from all parts of California, Oregon and Washington, and from various points in British Columbia, Idaho and Nevada. The latest to report is Great Falls, Montana, with a single tube! Some almost unbelievable reports have been received of reception with very poor antennas. Judging from the splendid work accomplished by this telephone at the time of year it has been operating, we look forward to exceptional results during the coming static-free season.

RADIO STATION 6DD—GRASS VALLEY, CAL.

"It works as good as it looks," says Mr. Phil Keast, referring to the accompanying illustration of his cleverly arranged station. A Radio Shop regenerative receiver with a three step amplifier

and a Magnavox comprise the essential parts of the receiving equipment. A 5-watt power tube is used for the third step of amplification with very good results.

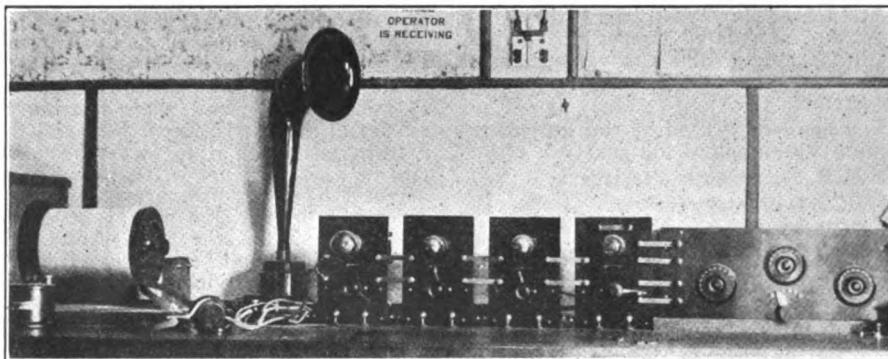
The transmitter consists of an Acme 1-k.w. transformer, synchronous gap, home-made oil condenser with glass plates 1-4 inch thick and a Wesrad oscillation transformer. No especial records have been broken in transmitting, but stations in Idaho have often been raised. With the addition of the synchronous gap 6DD will be able to do still better work.

A radio telephone transmitter, similar to the one used at the Fairmont Hotel, San Francisco, is under construction.

HOTEL OAKLAND HAS RADIO TELEPHONE

P. D. Allen, formerly radio officer in charge of the U. S. Navy receiving station at Honolulu, T. H., has installed a radio telephone transmitter in the Hotel Oakland, Oakland, California.

Mr. Allen is operating the station in conjunction with the Western Radio School, of which he is the director. Press is sent daily on 325 meters, from 7:15 to 7:30 p. m. Concerts are broadcasted on Tuesday and Friday evenings from 8 to 9 p. m. There are no Sunday concerts. Press matter is supplied by the Oakland Tribune for broadcasting. Mr. Allen is one of the "old timers" of the West in the radio game. He holds an extra first grade radio license, has had a number of years of sea service to his credit and is a "thoroughbred" radio man in every respect.



6DD—Grass Valley, Calif.

Radio in the United States Forest Service

F. K. Teeter Jr.

Each year thousands upon thousands of dollars of timber are wasted by that ravaging menace, fire, most of which is caused by the carelessness of man. To overcome this terrible waste, congress enacted laws, creating the United States Forest Service, a body formed to protect our forests from fire and to prosecute those who through their carelessness have caused these gigantic losses.

Every means of communication has been used by this department, to aid the cause the telephone, the heliograph, wigwag, and other well known means of signalling, until 1919, when radio was given its chance. The officers of the forest service and United States Army Air Service met together and planned the use of radio and airplanes, for the use of locating fires, for after our late war experience in spotting artillery shots over the line and reporting back by radio, why would it not be just as easy for a plane to fly over the forests and report any fires spotted back to its base. This method was used successfully during 1919 and 1920, and early in 1921 the Forest Service thought that this could be perfected to a greater degree by installing receiving stations at each forest headquarters.

They then appealed to the Air Service for equipment, which was granted, and to the Department of Commerce for the most reliable source of operators, and, as usual, the reply was to make the selection from the amateurs. Mimeographed blanks were then sent to all licensed amateurs, with the request that they fill them out and return to the Mather Aviation Field, at Sacramento, Calif. After these blanks had been returned, fifteen men were selected and the following stations created:

Station.	Call.	Wave Length.
Sisson	SN	350
Weaverville	WE	350
Alder Springs	AL	350
Mineral	ML	350
Quincy	QY	485
Santa Barbara	SB	350
Orleans	OS	350
Nevada City	NY	485
Placerville	PE	485
Sonora	SR	485
North Fork	NK	350
Hot Springs	HS	350
Los Angeles	LA	350
Yreka	YA	350
Happy Camp	HC	350

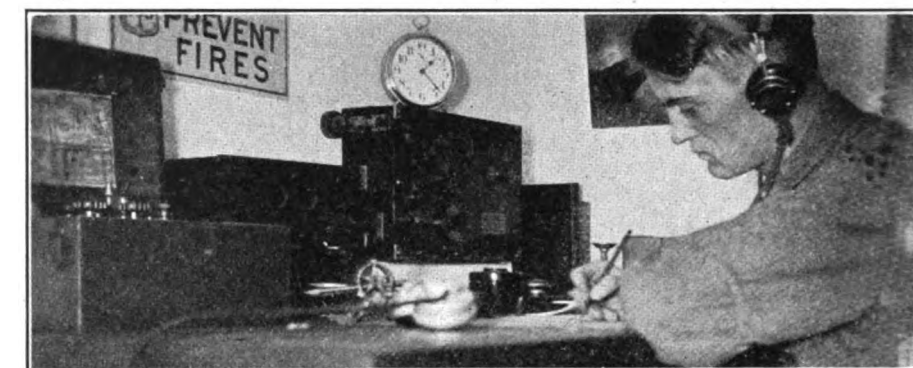
You will notice the wave length of some of the stations are different, the reason for that being to prevent any conflict in messages of one patrol with that of another.

At each airplane patrol base there is a C.W. and modulated buzzer transmitter, for broadcasting QST's to various forest stations, same working on 350, 485 and 600 meters.

The equipment used by the ground reception stations is as follows:

- 1 SCR 59, airplane receiver.
- 1 BC 14, crystal receiver.
- 1 SCR 72, 2-stage amplifier.
- 2 pairs, Western Electric phones.

The SCR 59 receiver is designed for usage in a plane, and consists of a straight tuner, tapped off to four contacts, having a condenser in the antenna circuit for fine adjustment and an audion detector and two-stage amplifier; the



The author at his set. During the war Mr. Teeter was president of the San Francisco Radio Club, which he held together during this trying period with but four members.

whole being enclosed in a case 10x12 inches.

The BC 14 is an army field set, being a loose-coupled outfit with a galena detector, and is for emergency use in case of a breakdown in the SCR 59.

The SCR 72 is an army two-stage amplifier, for use with the SCR 59, giving a total of four steps, but as yet I have not used this amplifier because with SCR 59, the signals from the planes when close are of such audibility that it is uncomfortable to allow the phones to remain upon ones' head, and at all times the planes are readable up to 80 miles and then they are about back to their base.

The planes are equipped with 1-8 kw. 500-cycle spark transmitters, consisting of a generator and exciter, driven by a small propeller, a transformer, a mica condenser and inductance, the whole being mounted and enclosed in a torpedo shaped shell, and placed on the running gear of the plane. The only equipment kept in the plane is a key and a radiation ammeter. The antenna consists of a single stranded wire with a lead weight attached to one end, which is known as a fish, from its shape. The use of this fish is to keep the antenna from tangling around the control wires and also give a vertical component to the antenna, in order to overcome a purely directional effect of radiation. Upon landing the antenna is drawn up upon a reel in rear of the observers' seat. The engine of the plane is used for a ground.

I can now see in the minds of the readers, the doubt of efficiency of this arrangement: there only being a transmitter on the planes with no receiver, and a ground station, with a receiver, but no transmitter. Or in other words, how is the observer in the plane going to know whether the ground station is getting him OK or not? To overcome this, if a fire is spotted, it is sent, repeated, repeated 15 minutes later, and when nearing the air patrol base, it is given them and they in turn telephone it to forest headquarters in which the fire is located. On my patrol I have had five fires reported, to date, and on the five fires I have been able to get it OK the first, second, third and last time, and upon inquiring of other ground stations have found that they have done as well as I.

We also use a panel system as another safeguard against inefficiency. These panels are twelve feet long and three feet wide and are placed in a conspicuous

place, in order that planes may readily see them.

All fire messages are sent in code, it being found necessary to use a code in order to save time, as a few minutes may mean whether we have a big fire or a small one. The code adopted being as follows:

Fire Call—FFF

New or Old Fire

New—N. Old—O.

Location

T—Township. R—Range. Section S & Subdivision

Sizes—S

G—Single Snag. M—Camp fire. R—Sq. Rods. A—Acres.

Cover C

T—Timber. B—Brush. O—Open.

X—Burn or Cut Over.

Slope—S

L—Level. G—Gentle. S—Steep.

Wind Velocity and Direction—W

N—North. S—South. E—East. W—West.

The patrols carry maps of the territory over which they fly, these maps being divided into townships, ranges, sections, quarter sections, and also show all lookouts, mountains, rivers, railroads and anything which tends to help in the description and location of a fire. Duplicates of these maps are kept at each air patrol base and also at each forest headquarters, and any fires located are marked on these maps with red pins, and after the fire is out a black pin is substituted, so by this means the observers and forest men at all times know what fires are burning and their condition.

The average patrol flies about 400 miles per day, keeping a log of flights and observations.

Each ground operator is required to keep a log, and to mail same together with all copies of messages sent him from the planes. He is also required to keep a pin map and to confirm all fires by telephone, though where some of the stations, such as Sisson, Yreka and North Fork, which have transmitters, same is confirmed by radio, and communication is also kept with outside forest offices.

During 1922 or 1923 both planes and ground stations will be equipped with CW and radio telephone outfits, and then the peak of efficiency will have been reached, though the present system is working very satisfactorily.

Static Statistics from Everywhere

By Squak McGuff

Hello, "fellers," how's my spark? How do you get me? QRK, QRH, QTC, QRU, QSL, GE. "73," nil, cul, too much QRM, pls, grx, etc.

Oh, yes, I just received a delayed reply in connection with the balloon contest; i.e. 6CH's station. But first I'll have to go into a few details lest you get entangled with misapprehension. Sgt. Lufkin, who visits frequently at 6CH, noticed the 'fones were cracked. "How come?" he says to 'CH. "I threw them at a party who caused unnecessary QRM," says 'CH.

So now here comes the sequel. The delayed reply says:

"After careful consideration and concentration I am imbued with the idea that the balloon is for safety first. I noticed that when the door is opened the balloon blows to one side and 6CH invariably makes a quick movement as though he were sitting on the 110 A.C. I thought perhaps he might be afflicted with the St. Vitus' dance; but no, I believe he thinks someone is about to throw something from behind. Possibly a rolling pin from the party of the second part, who has called him many times for dinner."

If it wasn't that the contest is officially off I would award Mr. Lufkin the crisp notes.

The next verse is entitled: "Oh, who told Mr. Tate they were electrose?" accompanied by the Sun (son) who melted them. Miss Snodgrass will follow with: "It's some hot in Vacaville" at the organ.

Sergeant Lufkin is no more. At least the Sergeant part of it. He has checked out of Uncle Sam's brown suit and leggins. He goes about in a disillusioned manner, scratching his lower limbs. He cannot get accustomed to the fact that his leggins are loose. Civilian clothes ain't got no leggins, Mr. Lufkin.

I have a friend in the East who has written me. He did not sign his name. Of course, there is no way of telling whether he is a friend. At any rate he must be a friend because he says he is a radio bug. So am I. He writes in a style that has something in common with Ring Lardner. His ideas are like those of Kerensky, while he is practical like Mr. Ponzi.

He delves into doing away with Q.R.N. and other subjects of lesser importance with a deal of perseverance. He says that subjects like Q.R.N. are his selections of discussion. Mainly because he doesn't know anything about it. Neither does anybody else. That's why he can talk about it without being interrupted. Everybody takes it for granted he knows his business.

So he tells the Fordham Radio Club of New York many things. About Q.R.N. They, of course, don't know what he is talking about. I listened to an engineer lecturing one night. I couldn't just say whether he was talking English, French or Eskimo. When he finished they all clapped. I clapped, too. Fine speech! Hooray! I wouldn't know what this man was talking about either, only I have it down in black and white.

He says in part:

"A Flash! Lightning! And what did I see—Nothing. It was dark. "Stars were shining in the heavens." Of course when I read that I knew he was conducive to huns. And how could it be a storm? Perhaps someone fired at me point blank.

Blank cartridge. No. There it was again. A Flash! Gracious! The goose pimples pimpled out on my purple flesh like gooseberries. Aha. What was that? That bright light on the ground. Presto—a lightning bug. No, my friends, it's quite plain. History tells us that QRN is only in the summer. So is the lightning bug. Am I not right? I am. Therefore, we, as amateurs, us radio men, us bugs, we must exterminate this bug."

Professor Goosepimple here concluded. It was a great speech. They all clapped. Great excitement prevailed.

MORAL: When it's time to clap. Clap. Hooray!!



PUBLIC RECOGNITION OF A RADIO RECORD.

This illustration is self-explanatory, the text reading: "By use of a vacuum tube two amateur operators at Keyport, four miles from here, on Oct. 6, 1920, created a new wireless record by transmitting to Scotland with 1000 watt power a phonograph record."

The little lady sat in the parlor sewing. It was stormy outside. Little drops of rain pattered on the pane. The little lady, whose hair was gray, lived in a little gray house. 6CH lived next door.

She was humming an old lullaby as she sewed. Hark, what was that? Rats!! Certainly not. Her house was clean. A rat would starve to death therein. Hark. What was that? It was in the attic. Unmistakably it was a noise. She became nervous. She telephoned. "Hello. Is this the police? Well, there is a burglar in my house. Come quick."

Four burly, freckle-faced, red-haired Irish protectorates of the law rushed to the scene of the alleged criminal's activities.

"Listen," said the little lady.

They did.

A weird cadence emanated from the general direction of the stove pipe.

"Aha," says the burly captain. "He is still there. Let us attack." They rushed the garret. It was empty. (Brownie had stopped sending next door.)

After a thorough search they went down stairs. The officer reached for a glass of water. A hot spark reached out and got him when his bony finger was within an inch of the spigot. "Whoop," he yelled. The light went out. He reached up to turn it on. "Whoop," he yelled, as a full 1250 volts nipped his finger.

"Lady," he said, "this is beyond us. There is a deep plot here. Something superhuman. We must call in our physics department."

The next day 6CH heard about the commotion. Now 6CH is foxy. You have to hand it to him for brain work. He gently slipped upon the roof of the little lady's house and grounded the stove pipe. The police department is still watching the house. But 6CH hammers away in peace and the little lady in the little gray house is wondering. Wonder-

ing how in the world things come and go so quickly.

TACOMA

"Tacoma promises some photos of the leading stations in that territory." That's what they tell me in a letter. Well—. We are reserving the space, Tacoma. Come across.

In their onward flight of progress and aggressiveness the Tacoma Club has annexed another strategical victory in securing a room in the Chamber of Commerce. They are allowed full freedom of the rooms and contemplate the installation of a long and short wave receiver therein.

Tacoma says that the Portland Club has put into effect a new set of traffic laws. They don't seem to grasp the meaning at all. They want to know since when has Tacoma become a suburb of Portland. They well realize that their Portland brothers are fast; but that they are altogether too far ahead of the times.

According to Portland's view, we might say that Spokane's mayor and council will soon be out of a job. New York is going to annex it. Imagine meeting a friend on Broadway in New York and upon inquiry as to where he is residing: "Oh, yes, I live over in Spokane; got a commuter's ticket" ???

But taking it all-in-all, Tacoma thinks Portland's club is absolutely O.K.—inasmuch as Portland and Tacoma both wish to do "DX" work this winter. So Tacoma asks Portland: "For the love of Mike be reasonable and amend some of 'them there' stringent policies."

7CE is getting to be a regular "C.W." wizard. He has now arrived at the point where he can argue with 7KM, and believe-you-me it takes somebody who knows something to do that. He should have a Croix-de-combat. So far as known he is the only person having the necessary nerve to even think of such a thing. Well—it's the survival of the fittest. May the best man win. Stay with 'em, 7CE.

Hey, Skinnay! Has anybody got an X-ray tube for Otto Nicholson to experiment with? If you have any old junk aroun' mail it to him. He would sure appreciate it.

Tacoma says to Seattle: "Why all the high power for short distance work?"

7LV, Al Stenso, is recovering from an operation and will be back shortly. "Al" has had a hard time of it, and the "gang" all welcome him back with best wishes.

The following appeared in a newspaper of recent date: "An official in Washington said it was hoped that in the near future radio phones could be utilized to broadcast weather and market reports and other information. Such a system, he said, would eliminate the telegraphic code and make it possible for reports to be received in homes."

(Continued on Next Page)

Once Again—

RADIO

The new name of "PRN." no more—no less.

I wonder if he gets his news by runner. There must be some delay. We, of the Pacific Coast, have been doing this very thing for almost a year.

News from the WEST must be subject to "indefinite delay."

I also noticed in another part of the paper that "for the first time a dance in New York had been held to radio music. And the surprising feature of the whole thing was that the MUSICIANS WERE 30 MILES AWAY."

This certainly is interesting to us on the Pacific. But not NEW. The interesting part is that we are glad our Eastern brothers are following in our footsteps, even though they have been two years tardy. They dance to music from San Francisco in Tacoma, received on a GALENA detectors—800 miles.

PORTLAND

Portland announces that in order to get the proper harmony and co-operation for the coming winter campaign they must have rules. As a result they have got together and blossomed out with the following set of regulations. Woe be to the Adam's Apple that bubbles derogatory thereto.

1. Portland police report will be cleared between 9:30 and 9:45. (If you think the "cops" are after you, cause a lot of QRM.)

2. At 9:45 p. m. traffic manager, or one of his assistants, will ask for reports from long distance stations in Portland and vicinity and all stations will promptly report the traffic on hand, stating the number of messages for north, south and east. They will then QRX 'till 10 p. m., at which time the traffic is open for northern stations. As soon as one station clears his hook north he should QSQ the next man or sign off "CLR." It is intended that all northern traffic will be cleared by 10:30 p. m.

3. At 10:45 traffic will open for the south in the same manner as the north. Southern traffic will be limited to 11:00 p. m. (TAKE NOTICE ALL YOU SIXES.)

4. At 11:30 all eastern traffic will be cleared in the same manner.

5. Promptly upon completion of all traffic the traffic manager will come in and advise ALL CLEAR. As soon as eastern traffic has been cleared stations will be free to chew the fat, make tests, talk to Mars, etc. But, in the event a long distance station says QRJ-1, it is up to you to tell him QSU at schedule for traffic.

Traffic manager7XF
First assistant7ZT
Second assistant7ZB
Third assistant7ED
"Your co-operation is requested."

7BP, who has just returned from Alaska, where he spent the summer operating at KXV, says: "There are two things that smell like fish, one is fish and the other is Eskimos." Ralph is the same old man except for a slight change in his fist, which has taken on "oil tank" characteristics.

Royal Mumford (7ZJ) is with us again. He has been spending the summer on his homestead at Randall, Wash. He says the fishing and hunting were great. When he did not indulge in the above mentioned sport the time was spent planning that spark for the coming winter. "Long May She Oscillate."

7ZK, the first operator on the S. S. "Senator," has been taking in some of the big stations on his travels up and down the coast, and he says the Northwestern stations can easily hold their own with most of the Southern stations which he has visited. New ideas obtained while visiting these stations were many and he expects to try them upon retiring to amateur life.

7ZB and 7ED have only been on the job about every other night of late. There has been much speculation as to what their occupation is during these other nights. Some say "Moonshine," others say "Peaceful Dreams." From my calculations I would not say "Moonshine" because of their ability to hold the air down three nights a week. Again, I would not say "Peaceful Dreams" because why not take turns at "Dreamland" and not leave such frightful gaps in the air? But what is it? I am not Sherlock Holmes. I give up. Anybody that can put any light on the subject please do so at once.

Features in the November issue of "RADIO"

Beginning "Monthly Radio Patent Digest" an illustrated description of all the new inventions by Mr. H. G. Prost, one of the best radio patent attorneys in the country.

Illustrated description of the Federal Telegraph Company's big new station at Palo Alto.

"Four Flushing," a Dark Town radio tale of woe. First of a series of Darktown yarns by Clyde C. Young.

Another ripping good Samuel Jones story by Volney G. Mathison.

The How and Why of Radio Tuning, the first of a series of articles in ideas of one syllable, by B. F. McNamee, Chief Engineer of the Pacific Radio Supplies Co.

The Powerful U. S. Army C.W. station at the Presidio of San Francisco that radiates 21 amperes. By Captain C. I. Hoppough.

7ZT, ex 7DA, is getting in a few late hours. He has the same old 200 meter spark with the addition of a 375 meter wave.

SCIENTISTS HEAR RADIOPHONE LECTURE

One of the features of the recent meeting of the American Association for the Advancement of Science at the University of California was the first scientific lecture ever delivered over the air when Clyde Young of the Associated Press (our own Squak McGuff) spoke on "Wireless Telephony" from the station of the Leo J. Meyberg Co. at the Fairmont Hotel in San Francisco. The lecture lasted half an hour and every word was distinctly heard. Mr. Young was thanked over the telephone by the convention delegates for his lecture.

WIRELESS AT THE NORTH POLE

Dr. Donald McMillan, who sailed recently for a couple of years in the Far North near the magnetic pole, will have a wireless outfit adequate to reach civilization at many points, and can not only cheerfully keep in touch with everything that is doing, from Balkan wars to football scores, but can obtain scientific information of great importance. For example, if a magnetic storm starts up he can at once be informed of the exact moment of the first fling of the needle elsewhere, and will be in position to check the simultaneity of the onset of the storm and its exact correlation with the magnetic elements close to the north magnetic pole. With good luck he can get more information about the earth's magnetism and its correlation with solar disturbances in the next two years than has been obtained in the last 200.

PITTSBURGH RADIO ENGINEERING SOCIETY OUTING

The Radio Engineering Society of Pittsburgh held its third annual outing on Saturday, August 6, at the Pines. The affair proved to be the most successful of its kind ever held in Western Pennsylvania. An elaborate program was carried out and many prizes were given.

Among the events were speed contests of twelve and twenty-five words per minute, magnet and insulator races and competitive pie-eating contests. Prizes were also awarded for the best C. W. transmitter and receiver, best wavemeter and best workable old relic. The apparatus judged in these contests was all of amateur construction.

Among the 300 present were many well known eastern radio men, such as F. H. Schnell, of Hartford, Conn., traffic manager of the A. R. R. L.; F. S. McCulloch, of Cleveland, now vacuum tube expert of the Westinghouse Electric & Manufacturing Co.; Frank Schlamaker, of Mars, Pa.; L. M. Ripple (Radio 8 J. U.); C. D. Emery (Radio 8 P. E.), of Canton, Ohio; Roland F. Palmer (Radio 8 D. E.), of Akron, Ohio; J. J. McKinley (Radio 8 A. J. P.), of Uniontown, Pa.; C. M. Charpenmug (Radio 8 W. R.), of Connellsville, Pa.; John C. Stroeble (Radio 8 Z. W.), and William C. Kirbach, of Wheeling, W. Va.; John G. Hoop and Prof. R. C. Colwell, of Beaver Falls, and Frank H. Freshwater, of Rochester, Pa.

At a technical meeting held just before the chicken and waffle dinner, Mr. Schnell gave a short talk on "Traffic Regulations," followed by Mr. Frank Conrad, whose topic was "Continuous Wave Transmission." J. C. Stroeble spoke on "Cage Antenna Characteristics"; F. S. McCulloch spoke on "Power Tubes," and Mr. E. P. Wiggins delivered an interesting paper on "The Antenna Radiation System." Mr. W. K. Thomas (Radio 8 L. F.), whose radiophone has been heard in the Catalina Islands, discussed "Spark and C. W. Transmission," and Mr. Rosenberg, publicity engineer of the Westinghouse Company, spoke on the broadcasting feature of the Westinghouse Station K. D. K. A.

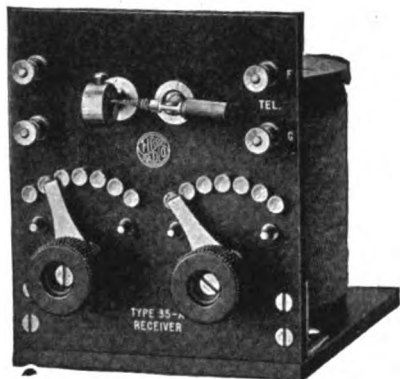
REGULAR CLUB ROOMS FOR CHICAGO CLUB

The Southside Radio Association now has regular club rooms at 2512 Blue Island Avenue. The rooms are open at all times and meetings are held each Thursday evening. A high class receiving and sending set has been installed and an effort is being made to make this club the best of its kind.

New Apparatus and Supplies from the Radio Manufacturers

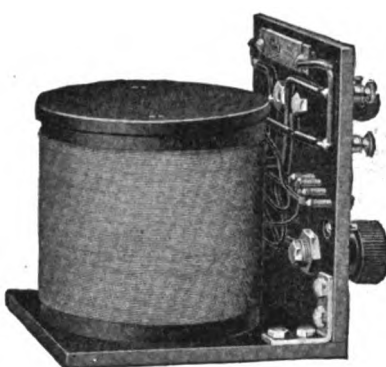
FIRCO MIDGET INSTRUMENTS

A complete crystal receiver set and an audion amplifier recently has been provided for the amateur who wants a small receiving set at low first cost. These are the Midget instruments manufactured by John Firth & Co. Inc., of New York City.



WESTINGHOUSE CO. INSTALLING INTERWORKS RADIO SYSTEM

The Westinghouse Electric & Manufacturing Company is arranging to demonstrate on a large scale one of the important commercial uses of radio apparatus by installing an interworks

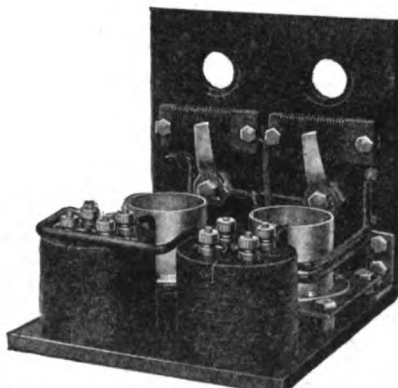
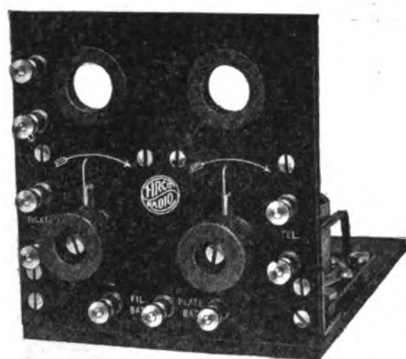


Front and Back Views of Firco Midget Receiver with Crystal Detector.

The receiver, as may be noted from the accompanying front and rear views, is a well made single circuit with a sensitive galena detector. The finish and workmanship are in every respect equal to larger standard sets manufactured by this company. The 1-4-inch Bakelite panel, like those in the Midget amplifier set, are 5 1/4 inches high. The binding posts likewise are arranged so that several units can be set alongside of each other and 3/4 inch busbars used to connect them.

system of wireless telegraphy and telephony. Factories at East Pittsburgh, Pa., Newark, N. J., Bloomfield, N. J., Springfield, Mass., South Philadelphia, Pa., Cleveland, Ohio, and elsewhere have been, or will be, equipped with high-powered transmitting and receiving sets, and it is expected that much of the pressing correspondence between these factories will be conducted by means of this system in the near future.

Several of the stations, notably those at East Pittsburgh, Cleveland, Spring-



Front and Rear Views of Firco Two Stage Amplifier.

The amplifiers are available in either one or two stages. They are equipped with Saco-Clad 100 per cent shielded transformers and are provided with Bakelite-base audion sockets and complete Firco air cooled rheostats. These have been successfully applied to six-stage amplification, wiring diagram for which will be published in an early issue. No. 14 hard-drawn copper wire insulated with varnished sleeving is used throughout, all connections being carefully soldered. All metal parts are made of heavy nickle-plated brass.

WIMCO ISSUES C.W. CATALOG

The Wireless Manufacturing Company of Canton, Ohio, has issued a catalog of C.W. transmitting and receiving equipment that contains many illustrations and descriptions of the latest types of C.W. apparatus. Every radio man should have a copy of the WIMCO catalog—if he is contemplating on going into the C.W. field.

field and Newark, are already in operation. The East Pittsburgh station (KDKA) has become well known to all wireless operators (professional and amateur) because of its nightly broadcasting of concerts, addresses, church services, government agricultural reports and other interesting radio-phone messages.

WESTINGHOUSE ACQUIRES STOCK IN RADIO CORPORATION OF AMERICA

The Westinghouse Electric & Manufacturing Company have sold the assets of the International Radio Telegraph Company to the Radio Corporation of America, retaining certain patents, and rights in foreign fields. They have also obtained a substantial interest in the stock of the Radio Corporation of America and made commercial agreements with them regarding the sale of radio devices which are manufactured by the Westinghouse Electric & Manufacturing

Company, and which they will continue to manufacture. They have also retained certain rights in the wireless field, among which is the broadcasting of information.

PARKIN DIAL TYPE RHEOSTAT

For the man building his own set a new dial type rheostat from the Parkin Manufacturing Co., of San Rafael, Calif., will prove a time and money saver. The non-corrosive resistance element is carried in a groove in the back of a three-inch molded Bakelite dial, which has a



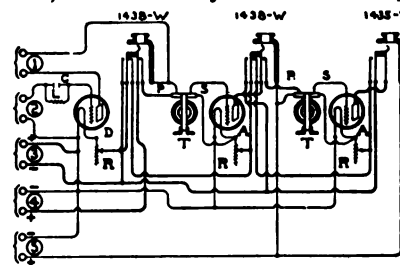
Parkin Dial Type Rheostat.

glossy black finish, all figures and graduations being filled with brilliant white enamel. The dial clears the panel by 1-16 inch, and runs true and smooth. A stop engages the stationary contact at the extreme positions, an "off position" being provided. The carrying capacity is 5 amperes, and the resistance 5 ohms, the full circle rotation insuring fine adjustment.

FILAMENT CONTROL JACKS

By Cyril J. Staud, B. Sc.

In accord with the general trend of the times, which is away from the multiplic-



DETECTOR & 2 STAGE AMPLIFIER USING FILAMENT CONTROL JACKS

NOTE
1-TO TIEHLER CON.
2-TO SECONDARY
3-TO 2X BAY 8 VOLTS
4-TO 2X BAY 16 TO 30 VOLTS
5-TO 2X BAY 40 TO 60 VOLTS
C-35B1-W GRID CONDENSER
D-DETECTOR TUBE
L-250-W 2 MFD GRID LEAK
A-AMPLIFIER TUBES
R-RHEOSTAT
T-250-W TRANSFORMER
"3667"

Fig. 1.

ity of switches which marked the "big set" of former days, is brought forth by the Federal Telephone and Telegraph Company the so-called filament control jacks.

They do not differ in construction from other types of standard telephone jacks, but their use in the hook-up given by the accompanying figures is a recent development.

(Continued on Page 118)

You Will Like—

RADIO

Just wait a month and see what the new name means to you.

Report of First Annual Convention



Official Photograph of American

THE first convention of the American Radio League at Chicago, August 30-September 3, was a great success, both from point of numbers attending and from value of the discussions held. About 1200 delegates registered, and a large number of people visited the radio show held in connection with the convention.

The delegates were registered at the two convention hotels, the Sheridan Plaza and the Edgewater Beach. Convention meetings were held in the Auditorium of the Swift Grammar School and the radio show was staged in the Broadway Armory, Broadway and Thorndale streets. All convention activities were thus fairly well centered and at a distance of about five miles from the center of town, or the loop. This was a decided advantage in being near Lake Michigan in view of the extremely hot weather which prevailed generally.

Most of the delegates had arrived on

Tuesday, August 30, and while no program was scheduled for this day, all hands were busy in getting located, meeting other delegates and the exhibitors—in getting their booths ready for the following (opening) day.

The convention was opened by the President, Mr. Hiram Percy Maxim, at 10:30 a. m. on Wednesday, August 31, at the Swift School. This followed the assembling of delegates for the accompanying photo. The actual number registered, however, is not shown in the picture—at least twice as many delegates not arriving in time.

Mr. Maxim read a formal speech in opening the convention, and characterized it as an epoch-making event in Citizen Radio. Plans for making the A. R. R. L. international in scope were outlined and mention made of the fact that delegates from every state in the Union were present, Canada, Alaska and South America.

He declared that electric power, generated at some great water falls, will ultimately be flashed by wireless to factories and cities thousands of miles away. He pictured vast possibilities for this scientific feat.

"There will have to be the discovery of some new materials and some new scientific principles before this transmission is possible," he said. "It is reasonable to hope that some day men may transmit electric power by wireless. It may be the next great electrical invention, although not in sight just yet."

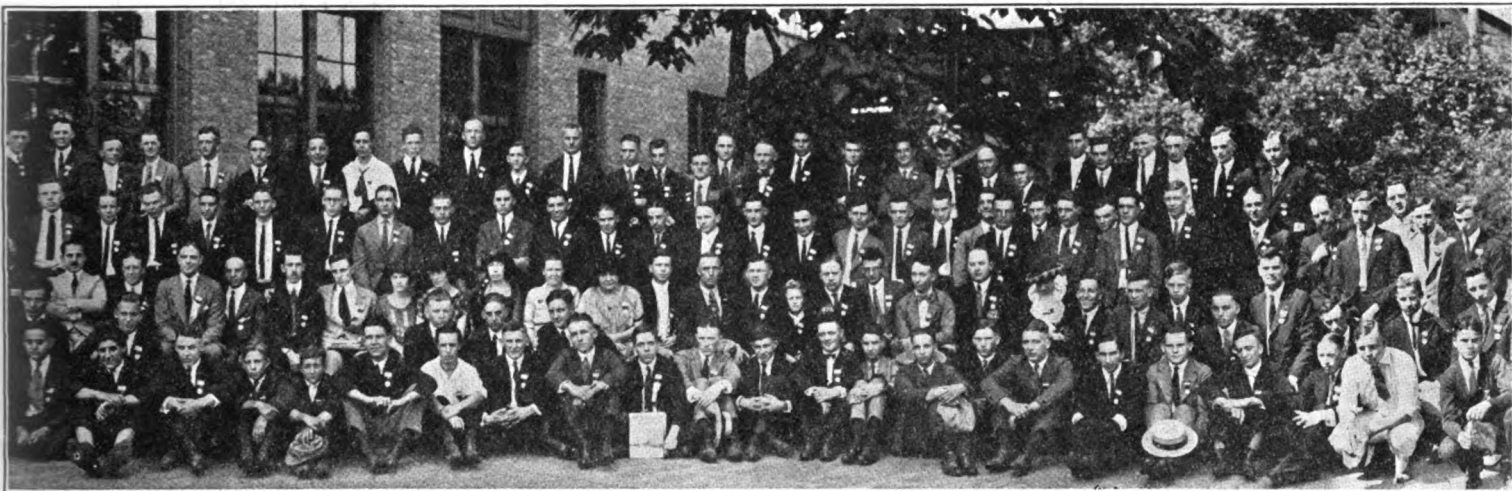
He also predicted that conventions in the future will be held by wireless with delegates sitting at home, hearing motions and speeches over wireless telephones. He gave as an example a recent test in Washington where an aviator made a speech to 10,000 persons assembled a mile and a half away from the point over which he was flying.

Addresses were also given by the rep-



Radio Show in Connection With Convention.

American Radio Relay League, Chicago



Radio Relay League Convention.

representative of the Mayor of Chicago and Coroner Hoffman of Cook County. The latter spoke in a humorous vein and stated that he was glad to meet the delegates in a social and not an official capacity. It appeared that the coroner's chief claim to radio recognition lay in his being the official donor of the land on which the station of Mr. R. H. G. Matthews, 9ZN, is erected.

The Secretary of Commerce, Hon. Herbert Hoover, sent as his representative, the radio inspector in charge of the Bureau of Navigation, Mr. Terrell, who



U. S. Navy Exhibit of Radio Controlled Boat.

gave a short address, stating that he had been sent to the convention by Mr. Hoover to learn wherein the department could best serve the needs of the radio amateur, through the A. R. R. L.

A short and interesting talk was given by Lieut. Parmenter, officer in charge of the Naval Radio School at the Great Lakes Naval Training Station, representing the commandant of the Ninth, Tenth, and Eleventh Naval Districts.

Other addresses were given by officials of the A. R. R. L. and others.

At the afternoon session, several speeches and talks were given, including discussion of interference, control, time, revision regulations, traffic regulations and observance of radio laws.

The big event of the night session was the debate between M. B. West, civilian radio aide at the Great Lakes station and Lieut. Ellery W. Stone, general manager of the Pacific Radio Supply Co., of San Francisco, on the subject of power

factor in radio circuits. The nature of the discussion will be better understood by a reference to the articles by the above men in the February, April and July issues of "QST". Lieut. Stone contended that contrary to Mr. West's statement, the inductive and capacitive reactances in a freely oscillating radio circuit, or in a forced oscillating radio circuit tuned to resonance with the impressed frequency, are equal and opposite in value, the resistance is the only impedance in the circuit and the power factor of the circuit is unity. Mr. West finally conceded all disputed points except that unity power factor obtains in a freely oscillating circuit such as a gap circuit. Accordingly, the matter was referred by telegram to the Radio Section of the Bureau of Standards, which wired back stating that in radio circuits as outlined above, the inductive and capacitive reactances are equal and opposite in value—the resistance thus being the only impedance in the circuit. This telegram was read to the convention at the second evening meeting and a committee was appointed to decide which contestant had won the debate. The committee, however, decided to remain neutral on the matter and in their report stated that the two contestants had been arguing from different premises—a fact which was clearly evident the night preceding. Lieut. Stone requested that the Bureau of Standards' telegram be read into the minutes of the meeting and rested his case on the bureau's telegram.

Further talks followed on spark transmission and reception.

On the following night, the convention was given over to a consideration of Spark vs. C.W. To start the meeting, a talk was given on "Vacuum Tube Construction," by Lieut. Stone. This talk was illustrated with 20 photographs of the plant of the Moorhead Laboratories of San Francisco.

One point brought out in Lieutenant Stone's talk was that the reason that resistance coupled radio frequency amplifiers for 200 meters had not been successful was due to the form of coupling and not to the capacity of the tube. The very fact that tuned output circuits can be employed for this purpose is proof that the capacity of the A-P tubes at least is small enough. The trouble lies in the carbon resistance coupling,

which acts as a very low resistance to radio frequency, and in fact such carbon rods are used as kick-back preventers in transmitters. Mr. R. H. G. Matthews of Chicago and convention manager, stated to the convention that Major Armstrong had made the same statement to him a few days before the convention, and the matter of designing a special tube for r.f. amplification was thus proved to be unnecessary.

A number of excellent educational lectures were given on the following day, and in the evening K. B. Warner spoke on "Effect of Radiophone on Traffic Work"; S. Kruse on "Fading Phenomena" and H. M. Anthony on "Sidelights on Radio Development."

The final banquet and dance was held at the Drake Hotel on the evening of September 3. The feature was the club roll call. In addition to these formal features the committee had arranged many novel and enjoyable forms of entertainment which were greatly enjoyed by all present.

SAN FRANCISCO RADIO CLUB NOMINATES NEW OFFICERS

At the regular monthly business meeting of the San Francisco Radio Club, Inc., held on September 1, the following nominations for officers were made: President, H. W. Dodge, H. W. Dickow and E. Schivo; vice president, C. Thompson, S. Fass, M. Heeder; secretary, H. W. Dodge and E. Schivo; treasurer, C. Schomaker (elected); sergeant at arms, M. Heeder and E. S. Peterson.

Election of officers will take place on October 6. Installation of officers on October 13. The newly elected officers will be installed by a prominent radio official of San Francisco. All local radio men, amateur or commercial, are invited to attend the installation. A lively program for the occasion has been arranged.

WESRAD NOW AT OAKLAND

Western Radio Electric Co., of Los Angeles, has opened a branch at 274 Twelfth street, Oakland, Calif., where the radio amateur may get anything that he wants in the way of radio equipment and supplies, including general laboratory apparatus. The same Wesrad Service that has proven so popular at Los Angeles is now available to the San Francisco Bay radio enthusiasts. B. R. Norton has charge of the new Oakland store.

EXPANSION!

NOT OF THE WAISTLINE
BUT OF

WESRAD SERVICE

OUR NEW STORE
IS OPEN

STATIC ROOM N'EVERYTHING

274 Twelfth Street
OAKLAND :: CALIF.

You Can't Keep a
Good Man Down—
Neither Can a Policy
That Strives to Please—
Stay Put!

OUR STOCK BULLETIN AND PRICE LIST

In a new and handy form—
The only Always-up-to-the-minute
Price Dictionary in the field

Indispensable to the careful purchaser
At your service

"FOR RADIO ONLY"

WESTERN RADIO ELECTRIC CO.

550 SOUTH FLOWER
LOS ANGELES

274 TWELFTH STREET
OAKLAND

CALLS HEARD BY WESTERN AMATEURS

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

CALLS HEARD BY 6AS, SAN FRANCISCO
(6AK), (6DP), (6EB), (6ED), (6FH), (6IC), (6KP), (6LC), (6MH), (6MN), (6PJ), (6ZX), (6ABW), (6ADL), (6AGF), (6AAK), (6AID), (6AJH), (6ALE), (6CW), (6ACR), (6AQU), (6AMW), (6BP), (6ED), (6GA), (6IN), (6IU), (6OZ), (6ZB), (6ZT), (6ZJ).

CALLS HEARD AT 6OC, SAN FRANCISCO, AUGUST 14-31, 1921
(6DP), (6FH), (6IC), (6KP), (6MH), (6PJ), (6PR), (6TF), (6ABP), (6ABW), (6ADL), (6AEW), (6AGF), (6AIB), (6AJH), (6ALE), (6AMW), (6AQU), (6AVB), (6BF), (6ED), (6IN), (6IU), (6GA), (6KM), (6QZ), (6OZ), (6ZJ), (6ZT).

September 1, 1921.
6IC, 2408 O St., Sacramento, Cal.
The Pacific Radio News,
San Francisco, Cal.

Dear Sir:

I am inclosing a list of calls heard during the month of August 1 to August 31, to be printed in your next issue of the Pacific Radio News:

6AE, (6AR), (6AS), (6AV), 6AAK, 6AAW, 6ABG, CW, (6ABJ), 6ABP, 6ACR, 6ACY, (6ADL), 6AEI, 6AER, 6AFH, 6AFO, (6AGA), (6AGF), 6AID, (6AJH), 6AJK, (6ALE), 6ALU, (6AMW), 6ANK, 6APE, 6APH, (6AQU), 6ATQ, 6AVV, 6BK, (6CH), (6DP), (6DY), 6DS, 6EA, (6EN), 6EX, 6FK, 6FT, 6GL, 6HC, 6HP, 6HY, (6IM), (6KA), (6KC), (6KP), 6KS, (6LC), 6MH, 6MN, (6OC), (6OH), (6OM), (6PJ), 6PO, 6PR, (6TF), 6TV, 6VX, 6WO, 6WR, 6WZ, 6ZC, 6ZAE, (6ZN), 7AY, (7AD), 7BK, (7BP), 7CB, 7CN, (7ED), (7GA), (7IN), 7IE, 7IW, 7IV, 7IY, (7KM), 7OZ, (7QZ), 7XD, 7ZA, 7ZB, (7ZJ), 7ZM, 7ZQ, 7ZS, (7ZT), (7ZW), YA.

Using one tube and spiderwebs. Thanking you in advance, I am

E. STADLER, 6IC.

LIST OF CALLS HEARD AT RADIO 6IV, FROM MARCH 30 TO AUGUST 2

6ZA, (6AE), 6AH, 6AR, 6BW, 6CA, 6DA, 6DP, 6EA, 6EB, 6EN, 6ER, (6EX), 6FE, 6GF, (6GM), 6GP, (6GT), 6HC, (6HG), 6HK, 6HY, 6IF, 6IG, 6IH, (6IR), 6IS, 6JM, 6KA, 6KC, 6KM, 6KP, 6KS, 6KX, 6LC, (6LI), 6MR, 6MZ, 6NC, 6OH, 6OT, 6OW, 6PJ, 6PO, 6PR, (6QR), 6TC, (6TF), 6TV, 6UN, 6VX, 6WH, 6WZ, 6XAD, C.W.: 6ZA, 6ZAA, 6ZE, 6ZH, (6ZJ), 6ZN, 6ZR, 6ZU, (6ZX), 6ZZ, 6AAG, (6AAH), 6AAT, C.W.: 6AAW, 6ABM, 6ABW, (6ACG), 6ACM, 6ACR, 6ACY, 6ADA, 6ADL, 6AFN, 6AGF, 6AGL, 6AGN, (6AGP), 6AHV, 6AIB, (6AII), (6AIO), 6AIK, 6AIU, 6AIW, 6AJH, 6AJL, 6AKL, 6ALE, C.W.: 6ALU, voice; 6ANK, 6APH, 6APO, (6APZ), 6ARI, 6ASS, 6ATB, C.W.: 6ATG, 6AUL, C.W.: 7CN, 7DA, 7ZJ.

HEARD BY 6ABW, ROSEVILLE, CAL.
6AE, (6AS), 6AAK, (6ABM), 6ACY, (6ACR), (6ADL), 6AIP, 6AID, (6ALE), (6ALU, C.W.): 6AMU, 6AOX, 6APH, 6AQU, 6BW, (6DP), (6IM), 6KM, (6KS), (6MH), (6OC), (6PJ), (6PR), 6TV, (6TF), (6VX), (6WZ), (6ZN), (6BC), (6BK), (6BG), (7DA), (7ED), (7IU), 7JU, 7KB, 7KJ, 7KM, 7BR, 7WJ, 7XD, 7ZI, (7ZJ).

CALLS HEARD BY 6BF, SANTA PAULA, CAL., FOUR NIGHTS, AUG. 1-4, INCLUSIVE

6AE, 6AK, 6AR, 6DP, 6EN, 6EU, 6FT, 6GY, 6HC, 6HH, 6HT, 6IB, 6KA, 6KC, 6KM, 6KP, 6MH, 6MK, 6OH, 6PJ, 6PP, 6PR, 6TV, 6UO, 6VV, 6VX, 6WZ, C.W.: 6ZN, 6ZX, 6AAK, 6AAT, C.W.: 6AAW, 6ABW, 6ACR, 6AEI, 6AER, 6AFN, 6AGF, 6AGN, 6AJH, 6AKL, 6ALE, C.W.: 6ALU, C.W.: 6ALV, 6AMK, 6AMW, 6ANJ, 6ANP, 6AOR, C.W.: 6ARC, C.W.: 6XAD, C.W.: 7PF, 7YA.

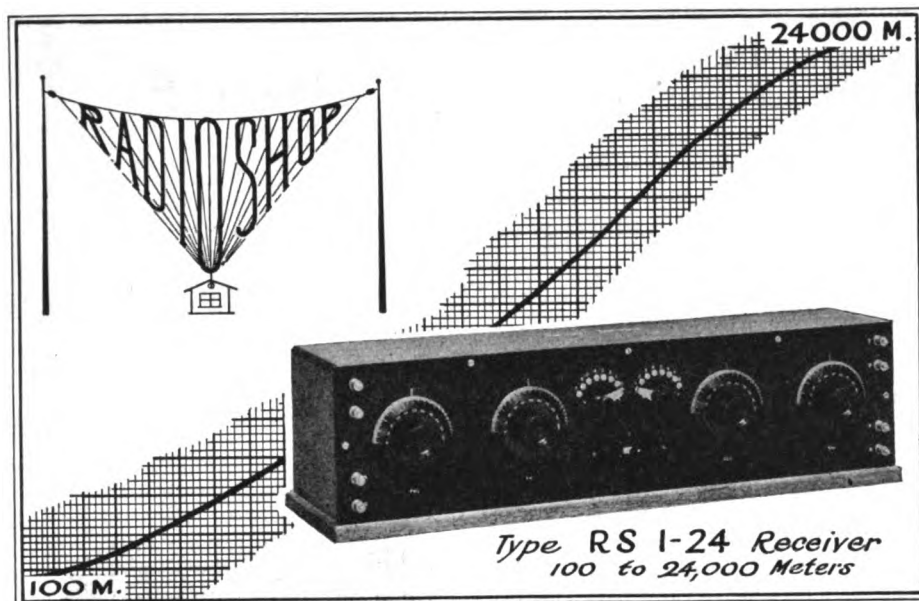
PAUL K. CHURCHILL.

CALL HEARD AT 6AJH, SAN YSIDRO, CAL., DURING JULY AND AUGUST

6IF, 6MK, 6ZN, (6ALU), 6AE, (6MZ), (6ZX), 6AMQ, 6AK, (6NY), 6AAG, 6AMN, 6DP, (6OC), (6AAK), (6AMW), 6EA, (6OL), 6AAU, 6ANK, (6EN), (6PJ), 6AAW, 6AGN, 6ER, 6PO, (6ABP), 6ALK, 6BX, 6PR, (6ABG), (6APH), (6FT), (6QJ), (6ABW), (6AQU), (6PG), (6SK), (6AC), (6ATG), (6HY), (6TV), (6ADX), 6ATQ, (6IF), (6VX), 6ADF, 7DA, (6KA), (6WH), 6AFN, 7ZJ, 6KH, 6WI, (6AGF), 6KM, (6WR), (6AIB), (6KP), (6WZ), (6AID), (6LC), 6DA, 6AJK, (6MH), (6VV), (6ALP).

(Continued on Page 107)

The RADIO SHOP type "RS 1-24" RECEIVER



An original application of regenerative tuning to a receiver that covers, with the utmost efficiency, every wavelength in use today.

Now ready for prompt delivery. The demand for the RS 1-24 has been far in excess of expectations but we have developed manufacturing conditions so that we can make immediate shipment

SAN JOSE

THE RADIO SHOP

CALIFORNIA

ANNOUNCEMENT

Watch this space for illustration of the new

Keystone V. T. Tube Socket

most rugged construction of any Socket on the market.

Sold on a money-back guarantee of Satisfaction, at the low price of \$1.25, prepaid.

Dealers: We have an attractive proposition for you.

Keystone Radio Co.

Greenville, Pennsylvania.

AMPLIFYING TRANSFORMERS

\$3.75 Bakelite encased. Compact. Efficient. Fully guaranteed on a money-back basis. Postage charges 12 cents.

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5534 Edgerly St., Oakland, Cal.

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls, from .005" to .020" thick.

Let us show how our standard products can be made to solve your insulation problems. Pacific Coast dealers carry a full stock of Bakelite-Dilecto, Vulcanized Fibre, Continental-Bakelite and Conite.

THE CONTINENTAL FIBRE CO.

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CALIFORNIA ELECTRIC SUPPLY CO., 643 Mission St., San Francisco

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525 Market St., San Francisco, Cal.

301 Fifth Ave., Pittsburg, Pa.

332 S. Michigan Ave., Chicago, Ill.

411 S. Main St., Los Angeles, Cal.

89 Wellington St. W., Toronto, Ont., Canada.

ARC RADIO MANUAL

\$2.50

Postpaid
Anywhere
in the U. S.

The Radio Engineers of the Federal Telegraph Company of San Francisco have compiled a wonderful book on the operation and care of small arc equipments for ship and shore station work. The book is written in non-technical, understandable fashion. No mathematics other than Ohm's Law resorted to. A valuable guide to the ship operator or those who desire to enter the Arc field. Limited supply on hand. They are going fast.

PACIFIC RADIO PUBLISHING CO., 151 Minna St., San Francisco.

Valuable New Features Added to Eveready Battery

The manufacturers of Eveready Wireless B Batteries announce two new features which are now being built into the No. 766 Battery, and which greatly increase its usefulness.

No. 766 Battery is now being made with wood container, of the same character as No. 774. This wooden case is impregnated with melted paraffine, making the battery, which is also sealed in wax, practically impervious to moisture.

A second feature—and one which is welcomed by all radio fans—is the installation of variable voltages. One negative and five positive terminals give a voltage of $16\frac{1}{2}$, 18, $19\frac{1}{2}$, 21 and $22\frac{1}{2}$. Each terminal consists of a flat brass strip with 3-16 hole in end for binding post.

These new features of the No. 766 are in line with ideal of the manufacturers of Eveready Products—to lead with the best.

And the price remains the same—\$3.50.

No. 766



No. 766

NATIONAL CARBON CO., Inc.

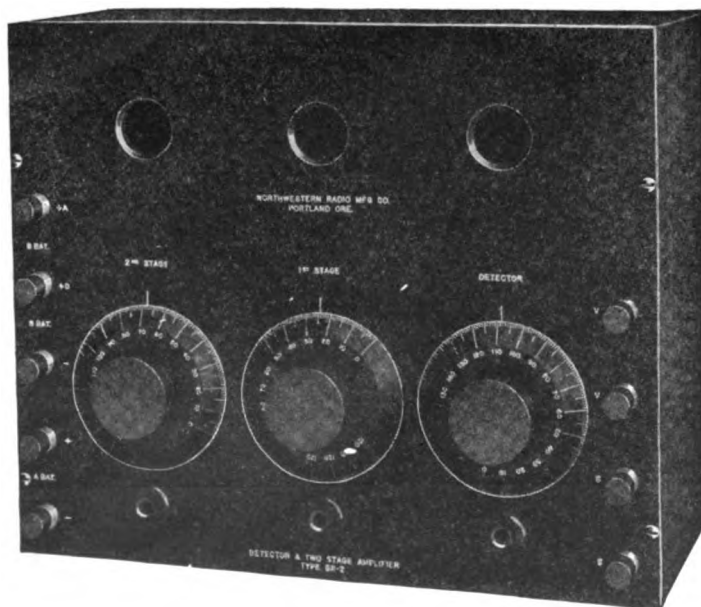
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California

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

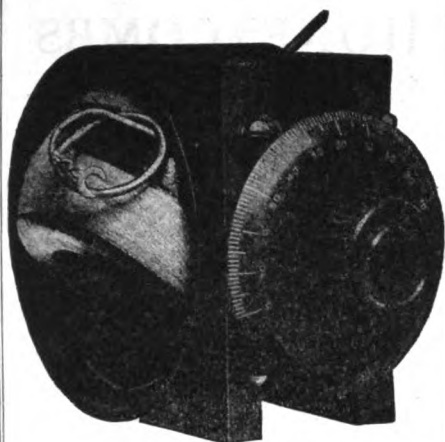
Detector and two stage amplifier Type SR-2.
Size of panel 10 1-2x12 3-4. Complete less
tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

When writing to Advertisers Please mention Pacific Radio News

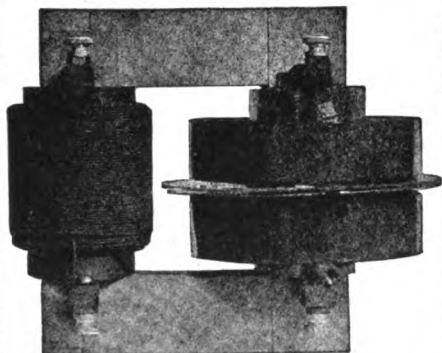


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry maxim to .1 mil henry minimum. Is readily used on table or mounted on panels.

Completed with 3-inch dial and knob \$6.50

Without dial or knob \$5.75



TYPE Z, R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price \$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps

CALLS HEARD BY 6AQT DURING JULY AND AUGUST

6AE, 6AK, 6AR, 6CH, 6DP, 6EX, 6FK, 6GO, 6GY, 6HC, 6HP, 6IC, 6JR, 6JW, 6KC, 6KM, 6LN, 6MW, 6MZ, 6OC, 6OH, 6PJ, 6PR, 6SK, 6TH, 6TV, 6VX, 6WO, 6WZ, 6ZU, 6ZX, 6AAK, 6AAR, 6ABW, 6ADA, 6AGF, 6AHN, 6AID, 6AIW, 6AIP, 6AJH, 6AKL, 6ALE, 6C.W.; 6AMW, 6APH, 6AWZ, 6ALA, 6APE, 6XAD, 6C.W.; 7GA, 7ED.

Calls Heard During Daylight
6MZ, 6AJH, 6AKL.
Anyone hearing my I.C.W. please QSL M. Graham 6784 Hollywood Boulevard, Hollywood, Cal.

Riverside, Cal., Aug. 8, 1920.

Pacific Radio News,
San Francisco.

Dear Sirs:

Please find enclosed list of stations heard. Some were heard with single coils and tickler and others with a variometer set. Only one bulb was used:

6AA, 6AR, 6ER, 6GJ, 6GM, 6GT, 6HC, 6HY, 6IF, 6IR, 6IS, 6IV, 6KM, 6KP, 6LC, 6LJ, 6LS, 6LY, 6MK, C.W.; 6PJ, 6RK, 6WS, 6ZJ, 6ZX, 6AAG, 6AGQ, 6AHU, 6AIW, 6AJK, 6ALE, C.W.; 6ALP, 6ALU, C.W.; 6AMW, 6AOE, 6APH, 6APZ, 6AQU, 6ARE, 6ASB, 'HM'-Telephone, 'RA'-phone.

I have no license yet, but am waiting for it, and expect it daily. Will probably put in a 100-watt C.W. set this summer and get started in time for the winter work.

Yours truly,

DONALD H. KEET,
469 Lime Street.

HEARD ON ONE-STEP BY 6AUN, 1730

PAGE ST., SAN FRANCISCO
6AE, 6AP, 6EA, 6EB, 6HH, 6IC, 6IO, 6KA, 6KP, 6LC, 6MN, 6OH, 6PJ, 6TV, 6ZX, 6AAK, 6AAP, 6AGF, 6AID, 6AIL, 6ALE, 6AVB, 6AWH, 6XAC, 6XAD, 6BK, 6BP, 6CA, 6CC, 6KJ, 6Q, 6XD, 6XF, 6ZT. Anyone hearing 6AUN please QSL.

CALLS HEARD AND WORKED RADIO 6AQU, H. B. BECKER, 1117 W. 45TH ST., LOS ANGELES, CALIF., DURING THE SUMMER MONTHS

(6AE), (6AK), (6AR), (6AS), (6CV), (6DP), (6EP), (6EX), (6FK), (6FH), (6FX), (6GF), (6HC), (6HP), (6HX), (6IC), (6IM), (6KC), (6KM), (6MZ), (6OC), (6OH), (6OT), (6PJ), (6PR), (6SK), (6TV), (6VM), (6VX), (6WO), (6WZ), (6ZB), (6ZU), (6ZX), 6AAK, 6ABW, (6ACR), (6ADA), (6AED), (6AFY), 6AFN, (6AGF), (6AID), (6AIP), (6AJH), (6AKL), (6ALA), 6ALE, (6AMW), 6ANK, 6ANZ, 6APH, (6ARW), (6AVB), 6BP, 6GA, 6IU, 6KM, 6ZJ, 6ZT. Will be glad to hear from anyone hearing me.

C.W. STATION 6AWT IN SAN FRANCISCO REPORTS THE FOLLOWING HEARD:

6AE, 6CV, 6EA, 6EB, 6HH, 6IC, 6KA, 6KP, 6LC, 6LX, 6MH, 6MN, 6RZ, 6BX, 6AAP, 6ADL, 6AGF, 6AID, 6ALE, 6AVB, 6AWH, 6XAC, 6BC, 6BK, 6BP, 6CA, 6CC, 6ED, 6KJ, 6KM, 6Q, 6XD, 6XF, 6ZB, 6ZJ, 6ZQ, 6ZT. All stations were heard during the month of August.



AMATEURS EVERYWHERE

are reading this national radio journal.

It is interesting and different. Each copy is worth the price of a year's subscription—One Dollar.

Write today for Sample Copy

RADIO TOPICS

4533 N. Sawyer Ave., Chicago, Ill.

BUY IT FROM THE NAVY

Surplus Navy Radio Materials for sale at attractive prices

RECEIVING SETS

suitable for receiving ship amateur, or long wave signals.

SPARK TRANSMITTERS

complete with motor generators or gas engine driven generators.

ACCESSORIES (except vacuum tubes) of every description, suitable for experimental or research purposes.

This is an **EXCELLENT OPPORTUNITY** for Colleges, Radio Schools and Amateurs to buy **NAVY—R-A-D-I-O—Equipment** at **ATTRACTIVE PRICES**.

Write today for Navy Radio Catalogue No. 601-61.

CENTRAL SALES OFFICE
Navy Dept. Washington, D. C.

The surplus materials the Navy has available for sale have been grouped as shown below and catalogues describing these materials will be sent on your request.

List of Surplus Materials

All Materials
Aeronautical Equipment,
Aluminum,
Bath Room Fittings and Plumbing Supplies,
Blankets,
Boats,
Books,
Brass,
Canvas and Tents,
Chemicals,
Cloth and Textiles,
Clothing,
Copper,
Electrical Equipment and Supplies,
Furniture,
Hardware,
Iron,
Lead,
Machinery,
Mess and Galley Equipment,
(Kitchen and Dining Room),
Monel,
Musical Instruments,
Navigating and Instruments of Precision,
Oils and Greases,
Paint and Paint Materials,
Provisions,
Radio Equipment,
Rope and Twine,
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Steel,
Tin,
Tools—Hand, Machine and Contractors,
Valves and Fittings,
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Phone San Jose 2126-J

Established 1909
1200 Students

OUR WAR RECORD—200 Men Trained—130 Placed in Service

**HERROLD COLLEGE
OF ENGINEERING AND RADIO**SPECIAL ATTENTION TO EXPERIMENTERS
AND AMATEURS

467 S. First Street

SAN JOSE, CALIF.

HONEYCOMBS**\$6.70** For a Set of 10 Coils.
Sent Postpaid in United States.

The following sizes comprise a set: 25 turns, 35, 50, 75, 100, 150, 200, 250, 300, 400. And the price of \$6.70 includes one of each. Cheapest and best constructed coils obtainable anywhere. Send stamp for circular of Superior Radio Supplies.

SUPERIOR COIL CO.
1831 Balboa St., San Francisco, Cal.

SOMETHING NEW**THE PARKIN DIAL TYPE RHEOSTAT**

(Patent Pending)

Consists of a 3-in. molded Bakelite dial, in the back of which is a circular groove containing the resistance element. This groove, being recessed, allows the dial to clear the panel by the usual distance of 1-16 in. An off position is provided, and a stop on the dial engages the stationary contact at the extreme positions. The 360 degree rotation insures fine adjustment. A brass bearing insures a true running dial and smooth action.

All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob.

Resistance is 5 ohms, carrying capacity 2 amps.

No. 77 Parkin Dial Type Rheostat. Postpaid \$1.75

FOR SALE BY ALL LEADING DEALERS

Send for free Catalog No. 4 describing our complete line. Dealers: Write for proposition.

PARKIN MFG. CO.

SAN RAFAEL, CALIFORNIA

**10c CHARGES YOUR BATTERY
AT HOME F-F BATTERY BOOSTER**

and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? A Storage Battery kept fully charged lasts longer and everything depending upon it works better, which is the secret of perfect battery service, and a Booster insures this. Do not run the risk of ruining an expensive battery, for it Costs Less to Buy a BOOSTER Than To Be Without One. The F-F Battery Booster is a Charging Apparatus, unfailing in its ability to deliver service day and night, is rugged and foolproof and requires no skill to operate. They charge automatically and operate unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. The AMMETER shows you just the amount of current flowing. Easily renewable and adjustable carbon electrodes rectify the current and last for thousands of hours. Everything is Complete in One Compact, Self-Contained and Portable Unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Current. New Models Now at PRE-WAR Prices:

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes.....	\$15
Type 16 charges 6 Volt Battery, at 8 Amperes.....	\$24
Type 166 charges 6 volt Battery, at 12 Amperes.....	\$32
Bantam Type 12 charges 12 Volt Battery at 5 Amperes.....	\$15
Type 112 charges 12 Volt Battery, at 6 Amperes.....	\$24
Type 1612 charges 12 Volt Battery, at 7 Amperes.....	\$32
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes.....	\$48

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights Complete with AMMETER & BATTERY CLIPS, 11 to 15 lbs. Order from your Dealer, or send check for Prompt Express Shipment. If via Parcel Post, have remittance include Postage & Insurance charges, or have us Ship C. O. D. ORDER NOW, or WRITE for FREE Descriptive BOOSTER BULLETIN No. 33.

**WIRELESS OPERATORS,
EXPERIMENTERS,
CAR OWNERS, STORAGE
BATTERY USERS****SERVICE STATION CHARGING
SERVICE AT ANY LAMP SOCKET**

Other F-F Battery Boosters charge batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. Do not think your battery is dead and worn out, because it seems dead. Buy a BOOSTER and Fill it with Life. A BOOSTER SAVES YOU MONEY.

BATTERY CHARGING STATIONS and GARAGES Use Our Large F-F ROTARY RECTIFIERS for Group Charging. Real Economy in First Cost and in Service. Charges up to 36 cells. Full Wave, Automatic, Dependable. It will also Rectify High Voltage. If the 110 Volt Primary of a High Voltage Transformer is connected to the Direct Current side of the F-F Rotary Rectifier, the secondary will deliver High Voltage Uni-Directional Current, suitable for Radio Work. Write immediately for New Free Descriptive ROTARY BULLETIN No. 33A, which gives complete information.

THE FRANCE MFG. Co.

Gen. Offices & Works, Cleveland, Ohio, U.S.A.
Canadian Representative: Battery Service & Sales Company, Hamilton, Ontario, Canada.

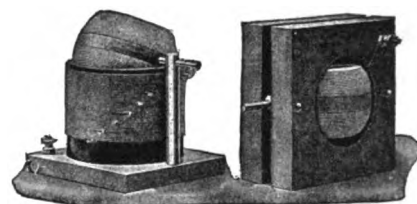
"B" BATTERIES**AN
EVEREADY
PRODUCT**

43V. Batteries, tapped.....\$5.00
22½ V. Batteries, Navy Type..... 3.50
22½ V. Batteries, Commercial

Type 2.50
Latter two types especially adapted to Cunningham and Radiotron Tubes. Postage Prepaid Anywhere in U. S.

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Wireless Engineers
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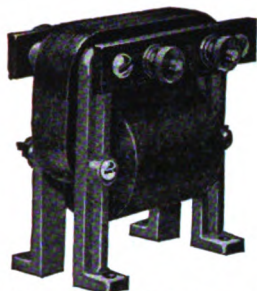
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READ THE CLASSIFIED COLUMN, PAGE 124.

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**ATLAS DX-92 SUPER OSCILLATION
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Mounted	\$14.00
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Core	3.50
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ATLAS CW TUNING INDUCTANCES
6 Inch Formica Tubes No. 8 Enameled
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25 turn inductance	\$ 8.00
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The debut of ATLAS RADIO PRODUCTS marks a new high water mark in Radio. ATLAS instruments include only the most efficient and most demanded. The distributing of ATLAS APPARATUS is your opportunity paramount. Do not buy your fall and winter stock of CW and receiving apparatus until you have seen ATLAS products and secured our catalogue and discount schedule.

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Double, semi-mounted	\$ 5.50
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Detector and 1 step panel	\$23.00
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**ATLAS SPECIAL RHEOSTATS FOR
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50 ohm 3 ampere at 110 volts for pri- mary control of 5 watt power tubes	\$5.00
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50 ohm 15 ampere at 110 volts for pri- mary control of 250 watt power tubes	15.00

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One Step RADIO FREQUENCY Amplification

(To Bring Up the Weak Signals)

Then:—

A Supersensitive Detector Tube

(To Detect and Amplify Them)

Then:—

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(To Make Them Roar in the Phones!)

This is the NORTHRAD THREE-TUBE ULTRIFIER, the most sensitive Detector-Amplifier unit ever developed. Our Laboratory tests were amazing in results

We gladly send complete information to all who are interested. If you want to get results that will astound your radio friends, get on our mail order list. Our customers everywhere are record breakers and record makers, and our prices are right. Our CW Catalogue is now ready for distribution. Send for your copy.

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331 New Call Bldg., San Francisco

NORTHWESTERN RADIO ASSOCIATION

Portland, Oregon

Editor P. R. N.,

San Francisco, Calif.

Dear Sir:

The amalgamation of all the radio clubs of the Northwest is well under way, and it is expected to result in better co-operation and understanding between the various radio bodies of the Northwest.

The organization is to be called the "Northwestern Radio Ass'n." The different clubs, such as the present Portland, Tacoma and Seattle clubs will be branches of the N. R. A. and will be addressed as follows: "Northwestern Radio Association, Tacoma Branch," etc.

The leaders of the different branches will meet at different times during the year at some central town to carry on any legislative business necessary for the good of the association.

The first and greatest task to be handled by the new association is to bring an International Convention of all radio men, including amateurs, commercial operators, radio manufacturers, radio engineers and inventors from all over the world to Portland, Oregon, in 1925.

This will be during the "Atlantic-Pacific Highway Electrical Exposition" and all attending this convention will not only be lucky enough to be present at the convention, but will see the greatest exposition the world has ever seen.

Now we well realize that it will be impossible for this association to make a success of this convention without the co-operation of the various radio papers and journals. The "Pacific Radio News" is one of the papers we are very anxious to have back of us in putting this convention through. We well realize that it will be almost four years before the convention, but an undertaking of this size cannot be successfully carried out in much shorter time.

We hope to see your paper back of us by helping us put this thing through, by articles in its favor in your editorials and columns.

Faternally yours,

(Signed)

C. B. CRITESER, 7DA.,

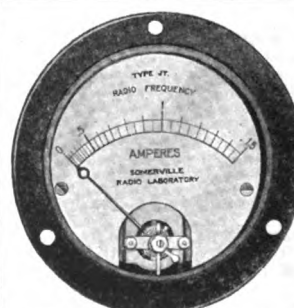
N. R. A. Publicity Agent.

Editor's Note: We're with you to a sizzle, fellows.

\$5 AUDION PANELS \$5

Panel, 15 letters, has grid leak and condenser, dial, posts for tickler, etc. Send 3c in stamps for enlarged lists and data.

50c for Audion Bulbs 50c
"ARK" RADIO SUPPLY
97 Hill St., Shelton, Ct. R.



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Generous size—3¾ in. diam. Extremely accurate and rugged movement. Jewelled bearings. Supersensitive Thermo-Couple. No zero adjustment necessary.

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A2 Acme, Unmounted	4.50
A2 Acme, Semi-Mounted	5.00
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UV712 Radiotron	7.00

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6 Volt 40 Amp. hr. Storage	18.20
6 Volt 60 Amp. hr. Storage	20.80
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94 Knob and lever for above	.45
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No.	Mounted	Unmounted	
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" 35	1.40	.50	
" 50	1.50	.60	
" 75	1.50	.60	
" 100	1.55	.65	
" 150	1.60	.70	
" 200	1.65	.75	
" 250	1.70	.80	
" 300	1.75	.85	
" 400	1.80	.90	
" 500	2.00	1.00	
" 600	2.15	1.15	
" 750	2.35	1.35	
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Pacnet Universal CW Condensers, any capacity	2.00
CW Tuning Inductance	8.00
Variable Grid Leak 8000 ohm.	3.00
Wireless Shop Condenser, 0008.	9.00
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Brandes Superior	8.00
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Baldwin Type C Navy	13.75
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Federal 1421 open Circuit Jack	.70
Federal 1422 single Circuit Jack	.85
Federal 1423 double Circuit Jack	1.00
Federal 1435 automatic Filament Control Jack	1.20
Federal 1438 automatic Filament Control Jack	1.55
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92 Remler Socket	1.50
156 General Radio	1.50
650 Murdock	1.00
R300 DeForest	1.60
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VARIABLE CONDENSERS	
230 Wireless Shop Panel Mtg. .0005	3.60
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630 Wireless Shop Panel Mtg. .0015	7.50
1 Chelsea Mtd. .0011	5.00
2 Chelsea Mtd. .0006	4.50
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REGENERATIVE RECEIVERS	
Myco D12 175 to 25000 meters Detector 2-step Amp. less Coils and Tubes	165.00
CR3 Grebe Relay Special	68.00

MISCELLANEOUS	
Aerial Wire No. 14, hard drawn, 80 feet to the lb., per lb.	.50
Magnavox with new 14-Inch horn	45.00
Formica Panels, cut to size, 20 cubic inches to the pound, per pound	2.50

Every Wireless Experimenter should have a copy of our 200-page catalogue. 35 cents in stamps will bring it to your door, or it will be sent upon the receipt of an order covering \$1.50 purchase.

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San Francisco, Cal.

LEO J. MEYBERG CO.

752 So. Los Angeles St.,
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Operating the Fairmont Hotel, San Francisco, Radio Station 6XG.

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THE—

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S
Improved SWITCH

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3-4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G8, 4 West Park St.,
NEWARK, N. J.

"HUMBUG"

(Continued from Page 90)

on a two-inch coil an' a bunch of half-dead dry batteries.

"However, soon as it was dark, I adjusts the gap for the best spark I can get, which isn't very good, an' tries a few calls. I soon sees I'll never raise the yacht this way, an' I decides that the best chance we got its to broadcast distress signals, in the hone of pickin' up some vessel in the Bering Sea.

"It was well after dark now. A pale, sickly moon was shinin' down on the cold, black lava-rock; and down among the boulders on the beach, the Bering Sea swashed dismal-like.

"S-O-S S-O-S S-O-S Stranded on Skull Island," I begins repeatin' over an' over, slow an' steady. The gang, shiverin' in the damp, raw southwest wind, all stands around that little flickerin' blue spark, which keeps gettin' rougher an' weaker every minute, until at last it breaks down altogether.

"As I tinkers with the vibrator, givin' it a lighter tension, I observes Muckashouk standin' alongside me with his old tauntin' smile.

"Humbug, eh?" he says, questioning-like, pointin' at the outfit.

"No, blast you, no humbug!" I howls, jumpin' to my feet. 'Get away from me an' stay away from me, before I knock your blasted block off!"

"I fusses around with the coil a little longer, but the batteries are about gone, an' at last I gives it up.

"We'll haft'a wait an' see if anybody's picked it up," I tells the bunch. 'If nobody shows up by tomorrow night, the batteries'll be recuperated a little, an' I'll try again.

"We sets up the tents an' rolls into our blankets, but we don't sleep much. Morn-

in' comes, cold an' clammy. We makes a fire with some of the alder boughs from the old burial platforms, an' sit around, miserable an' gloomy, all day. No boat shows up, an' I don't expect none.

"That night I sends out the distress signals again, but in a few minutes the batteries drop down to nothin.' I hooks in all the audion batteries, but it didn't help none. Meanwhile, old Muckashouk comes hangin' round again with his blasted insultin' smile. As I close up my apparatus-box, I can see he's goin' to speak. Pretty soon he comes out with it.

"Humbug now?"

"Well, I gets's so blasted mad I near to chokes.

"Say, I told you to keep away from me!" I yells, steppin' up to him and shakin' my fist in his face. 'Things is bad enough without a miserable old flea like you naggin' around makin' 'em worse! Now you shut up an' keep shut up, or I'll bust your homely old map!"

"We spends another night an' day of misery, gettin' more despondent all the time. The weather is gloomy an' cloudy, with the raw, wet southwest wind still holdin' on. In the afternoon, I tinkers with the coil again, but the batteries are sweatin' all over now, an' so near dead I can't get a buzz.

"S'all off," I tells the bunch. 'We're up against it!"

"Nobody says a word. Pretty soon old Muckashouk gets up from the rock he's sittin' on, an' shuffles over to me.

"Uh-huh, humbug now, eh?" he remarks, with his sour smile.

"I bounces to my feet, aimin' to smash him in the face, but just as I was about to let drive, I gets a queer hunch.

"Yes!" I says, all of a sudden, sittin' down again, beaten-like. 'It's humbug.



THE VARIO-COUPLER

BEARING SHAFTS with spacing should-ers turned from the shaft itself. (NOT loose tubing or washers slipped over), are used, assuring good contacts. This also prevents shaft from becoming loose in rotor.

BEARING STANDARDS are made from flat brass stock, so formed, drilled and tapped that, without any changes whatever, Vario-Coupler may be mounted on back of panel or directly on table.

VARIO-COUPLER. Price without dial\$4.00
With Remier Dial. Price\$5.00

Order direct from this ad.

Satisfaction guaranteed always or money refunded. Send for our complete, new catalogue "P." You'll find it interesting. It describes everything in Radio. **YOUR PANELS ENGRAVED** with our **GORTON ENGRAVER.** Prices right.

DEALERS! We are distributors for nearly all Standard Lines. Write for our Special Proposition.

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TELEPHONE MAINTENANCE CO.

17 N. LaSalle St.

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TELMACO VARIOMETERS and VARIO-COUPLERS

THE VARIOMETER

All windings are secured with special cement, which is colorless, extremely adhesive and has **NO CAPACITY EFFECT.** No glue, shellac or beeswax is used. **BEARING PLATES** are sunken flush with wood forms, allowing variometers to be mounted flat on back of panel without spacers, also insuring absolute rigidity and permanency of spacing between rotor and stator windings.

A very special feature is the construction of our **BEARING SHAFTS** and **CONTACTORS**, which besides allowing shaft to turn freely, insures a perfect electrical contact without "pig-tailing." Outside dimensions of stator blocks is 4"x4" inches.

VARIOMETER—Price each, without dial\$5.00
With Remier Dial. Price\$6.00



Wireless is all humbug. Heap plenty rotten humbug! More humbug than missionaries an' tin-horn gamblers;

"A-a-ah! *Asith-tuck!*" croaks old Muckashouk; an' we're all amazed to see that he's kind'a smilin' all over. 'No tell truth, die—tell truth, no die!' Beckoning to us to follow, he leads us down to the beach; an' there stowed away among the boulders, is the ten-gallon can of gasoline we'd missed from the boat!

"Well, don't that beat yuh!" sputters the Head-Cracker.

"It does," I answers, solemnly.

"Muckashouk stoops down to pick up the can of fuel—an' then he stops an' stares with a sickly look on his wrinkled face. We all look, an' see, around the bottom of the can, some little puddles of gasoline. Tin-Pan grabs the empty can, an' turns it over. Along the bottom edge is a nasty rusty crack, about half an inch long.

"Double-crossed hisself!" mutters the Head-Cracker. 'Serves him right!'

"Never mind him—how about us?" busts out Tin-Pan, wild-eyed.

"Old Muckashouk's sour smile was clean gone now.

"Me darn fool!" he says. Then he hangs his head an' stumbles off.

"A little later we have a conference. I suggests we try to sail or row the boat, in spite of the wind an' current, but the sordoughs veto that idea, declarin' it would only be committin' suicide.

"We know this place," says the Head-Cracker. 'Durin' these spring months of th' year the Aleute burial parties have the fight of their lives sometimes with this current—even in their narrow, speedy kyaks;—an' in this old tub we'd go straight out into the middle of the Berin' Sea.'

"That night, the southwest wind brings a cold, gray fog out over the water, makin' a clammy ghost-land out of the island. About two in the mornin' I was dozin' by fits an' starts, half froze to death, when all of a sudden Tin-Pan flies up out'a his blankets with a blood-curdlin' screech that brings us up all standin'.

"Ow! Help! Help!" he howls. 'They're walkin'! Them skulls an' bones is walkin'!'

"Sufferin' wildcats! Where?" I yells, my hair standin' on end.

"Everywhere! All around here!" blubbers Tin-Pan, hoarse-like. 'One bony clatterin' sku'ton with long black hair on its skull come an' grinned right in my face!'

"Yer gittin' out'a your head, Tin-Pan," says the Head-Cracker, soothin'-like; but I notices he looks around pretty sharp in the fog himself. There was no more sleep after that. I walks up an' down among the rocks till daylight, doin' some of the hardest thinkin' I ever done in my life.

"When you was a kid, did you ever fly a kite?" I asks the Head-Cracker, who is sittin' on a rock, wrapped in his blanket.

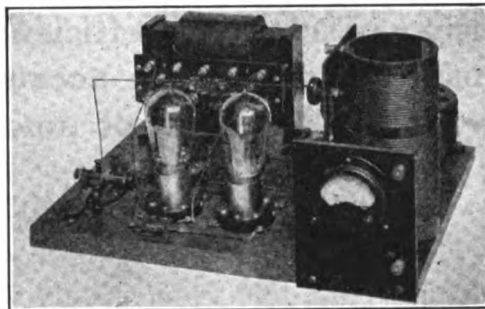
"Murderin' snakes! Are you gittin' cuckoo, too!" he gasps, starin' at me. 'What we got to do with kites?'

"A lot, maybe," I tells him. "It's just about our last chance of getting away from this bone-pile alive.

"We tears a batten off the gas-boat, an' with our jack-knives makes a kite frame. Sir Ambrosius contributes a silk undershirt—pretty dirty now—for a coverin', an' we rips up Greasy Bill's extra pair of pants for a tail. I had about 200 feet of seven-strand aerial-wire, which I puts the gang to untwistin'. I splices the single

(Continued on Next Page)

An Amateur C.W. Set That You Can Assemble



Connected directly to 110 volt A. C. lighting circuit—Approximate Range 400-500 Miles—Conservative Range 250 Miles.

The approaching Radio season will show a decided increase in C. W. transmission.

The remarkable ranges which may be obtained by even the most simple C. W. transmitter have changed the entire amateur outlook. Previous to the event of C. W. transmission a range of 50 to 100 miles was average work. Today an amateur—skilled or unskilled—can assemble a simple C. W. transmitter which will surpass his expectations. The illustration above shows a simple C. W. set, the parts of which are attached to a base-board. Anyone can assemble this outfit and wire it up. We have selected the necessary units for assembly, as follows:

Parts for Amateur C. W. Outfit

1 "Acme" 200 watt power transformer.....	\$20.00
2 Radiotron UV 202 5 watt transmitting tubes.....	16.00
2 "General Radio" tube sockets.....	3.00
1 "National" Rheostat, 3 ohms, 6.5A	5.00
1 "Tuska" 3-circuit inductance	12.50
3 condensers	3.00
1 Grid Leak, 10,000 ohms	1.25
1 C. W. Key	3.00
1 Radiation meter 0-2.5A, T. A. W.....	5.00
1 B. D. Panel for meter (with pole and binding post).....	1.50
1 Wood base (stained)	1.50

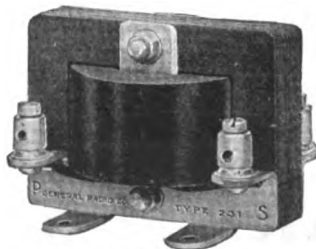
Complete parts, packed, ready for shipment.....\$72.25

ATLANTIC RADIO CO., Inc.

727 Boylston Street
Boston, Mass.

Branch, 15 Temple St.
Portland, Me.

DESIGN YOUR SET FOR RESULTS



Type 231A
Amplifying Transformer

Would you connect a garden hose nozzle to a fire hose? Not if you desired results. Then why build the best possible receiving set and neglect your amplifier?

An amplifying transformer should be a carefully designed electrical instrument. Our Type 231A Transformer is the result of thorough engineering research to obtain the maximum amplification possible with a Radiotron VU201 Tube.

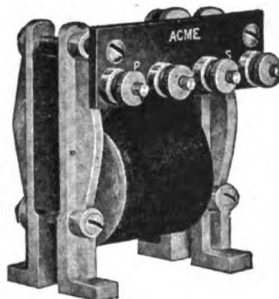
SEND FOR FREE BULLETIN 909C and learn how these results are obtained.

Price Completely Mounted \$5.00

ASK YOUR DEALER TO SHOW YOU ONE

GENERAL RADIO CO., Cambridge 39, Mass.

Concerning Amplifying Transformers



Although an Amplifying Transformer is small, its efficiency must be kept high on account of the small amount of power available.

The greatest losses are in the iron.

The core must be laminated in the plane of the flux or otherwise eddy currents are produced.

Eddy currents reduce the impedance and hence the efficiency.

The impedance should be approximately equal to the tube circuit.

The distributed capacity of windings should be reduced to a minimum.

Most howling is produced by connecting wires and not by stray fields.

A core type transformer is not affected by stray fields any more than any other type.

With efficient transformers it is not practical to use more than two or three stages of audio frequency amplification.

The Acme Apparatus Company was one of the first companies to put an Amplifying Transformer on the market for amateur use, and there are now probably more Acme Amplifying Transformers in use than any other make.

As Transformer and Radio Engineers and Manufacturers, we have devoted much time and expense to improve our transformers. When the available tubes changed, we changed our transformers to meet their characteristics.

IF A BETTER TRANSFORMER COULD BE MADE WE WOULD MAKE IT. WE CAN MAKE A CHEAP ONE, BUT DON'T WANT TO.

When you buy an Amplifying Transformer, get one of those manufactured by companies who back up their apparatus.

We Guarantee our transformers against defects in workmanship and material, BECAUSE—

We use a paper layer wound coil thoroughly impregnated.

No soldering flux is used in the coil.

The best of materials are used throughout.

The greatest care is exercised in the manufacture and testing.

GET AN ACME AND AMPLIFY FOREVER

ACME APPARATUS COMPANY

Transformer and Radio Engineers and Manufacturers

182 MASSACHUSETTS AVENUE, CAMBRIDGE, MASS.

HOOK'ER TO YER BULB-TUNERS

A full page ad. could not do justice to our new line of C. W. and phone equipment shown in our new 24 page catalog. Our tuners need no advertising. 10 cents brings catalog full of phone and receiving hook-ups, code and other useful information.

TRESCO, DAVENPORT, IOWA

RADIO APPARATUS



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Money Credited on First Dollar Purchase



EMPIRE RADIO EQUIPMENT CO.

271 WEST 125th STREET

NEW YORK CITY

strands end to end, makin' a total length of about 1400 feet. I figures that if I can get the kite to lift this, I might have a chance of breakin' in on K-O-X-N at Pirate Cove, about forty miles away, who works a midnight schedule on 1600 meters with N-P-R.

"But ain't your batt'ries dead?" questions the Head-Cracker, when I explains the idea.

"Yes—but ain't there a set of Edison batteries in the gas-boat for ignition?" I returns.

"We makes the kite, an' when we tries her out, she flies without any trouble. I gets the Edison cells out of the boat an' hooks 'em up to the spark-coil. About eleven o'clock that night we sends up the kite, an' pays out the bronze wire, which we had wound around a stick. When the wire is all out, the Head-Cracker hangs onto it with a piece of rope and a insulator. I hooks the end of the wire down onto the spark-gap, an' adjusts the coil. She didn't give a very long spark on that aerial, though it was bright an' fat. It didn't look bad—but K-O-X-N was forty miles.

"I begins hammerin' out the distress signals along with the same words I'd sent before; while the Head-Cracker stays alongside me, handlin' the kite. The wind is gettin' fresher all the time, an' the way that kite lunges an' jerks. once in a while makes me suck my breath. But the little bronze wire holds her until about two in the mornin', when a gusty squall snaps it at last an' carries the kite off into the sea.

"As daylight comes, the wind suddenly flies round to the northwest; an' like a crack of a whip, a freezin' gale comes swoopin' over Skull Island. In a few minutes the storm whips up a wild, white-crested chop, an' the icy wind rips off the tops of the waves, whirlin' up a white misty spray that covers the whole ocean.

"She's gonna be a blizzard!" predicts the Head-Cracker in a low voice, studyin' the dull gray clouds flyin' overhead. 'If we don't get away from here today we'll be froze t' death 'fore dark.'

"This is—aw—terrible!" declares Sir Ambrosius, scratchin' his dirty week-old stubble. 'If we could only manage a bawth—'

"Just then a gusty blast, bringin' a flurry of hard, dry snow, comes swirlin' over the island, an' both our tents turns into aeroplanes an' disappears. We all crouches around among the boulders, tryin' to find a little shelter, till in about half-an-hour the squall passes on, leavin' us pretty blue an' stiff;—an' then hardly a quarter of a mile off the island, pitchin' wildly in the white-capped seas, we discovers—a boat!

"Hurray!" yells Tin-Pan, jumpin' up an' huggin' Greasy Bill, who happens to be nearest to him. 'We're saved! We're saved!'

"It's th' 'Empress'!" says the Head-Cracker, studyin' the hull and top-work. 'She's a gas-boat belongin' to th' Pacific American Fisheries over at Port Moller.

"I never knew the 'Empress' was such a pretty boat!" blubbers Tin-Pan, who is still tryin' to kiss Greasy Bill. 'Whv, she's downright be-e-u-tiful!'

"The big tug bucks up to the mouth of the cove, an' sends a dory in to the beach for us.

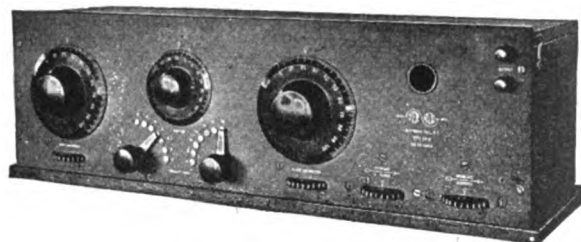
THE operator over at Pirate Cove picked up your distress call last night,' says the skipper of the "Empress," when we were all in the warm gallery, hard alongside a pot of fresh steamin' coffee (Continued on Page 116)



"Says Confucius: 'A man who, while living in the present age, reverts to the ways of antiquity, is one who will bring calamity upon himself.'"

"What terrible fate must be in store for him who, knowing the worth of the CR-8, persists in using ancient apparatus—which Confucius would have cast into the muddy depths of the Yang-Tse-Kiang."

Doctor H. M.



CR-8 SHORT-WAVE REGENERATIVE RECEIVER

is one in which perfection in even the minor details has been attained. It is indeed a masterpiece. Just look at these new features! Exclusive, every one of them:—

New moulded variometers—that will last a century.

Rubber-tired Verniers—make real tuning a pleasure.

Aluminum shields eliminate troublesome change of frequency when receiving C.W.

Direct reading wave-change and rheostat controls.

Battery binding posts in the rear—eliminating unsightly connections.

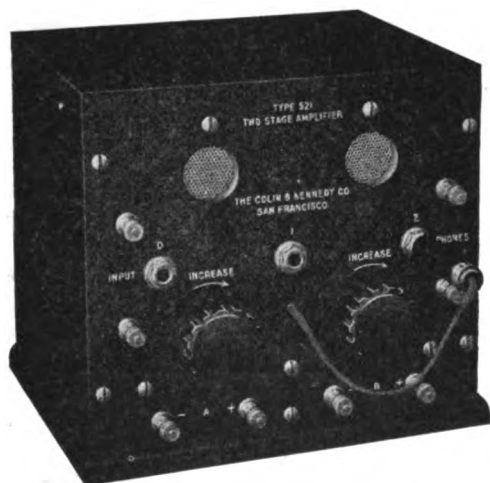
Constant calibrated wave-length range—150 to 1,000 Meters.

If it were possible to make a finer short-wave regenerative receiver, Grebe would be making it.

Your dealer will gladly order one of these receivers for your inspection. Ask him for bulletins.

A. H. GREBE & CO., Inc.

73 Van Wyck Blvd., Richmond Hill, N. Y.



**KENNEDY
EQUIPMENT**

Announcing KENNEDY Two Stage Amplifier

Type 521

Designed for Those Who Want Maximum Efficiency
in an Amplifier Occupying a Small Space.

Engraved Formica Panel. Mahogany Cabinet with hinged cover, affording accessibility to tubes and interior.

Special Kennedy Amplifying Transformers, yielding maximum amplification with freedom from noise and distortion.

Plug and jack arrangement permits ready change from detector to first or second stage without disturbing connections to telephones, and also affords flexibility of connections to extra phones or additional units of amplification.

PRICE : : \$55.00

ASK YOUR DEALER

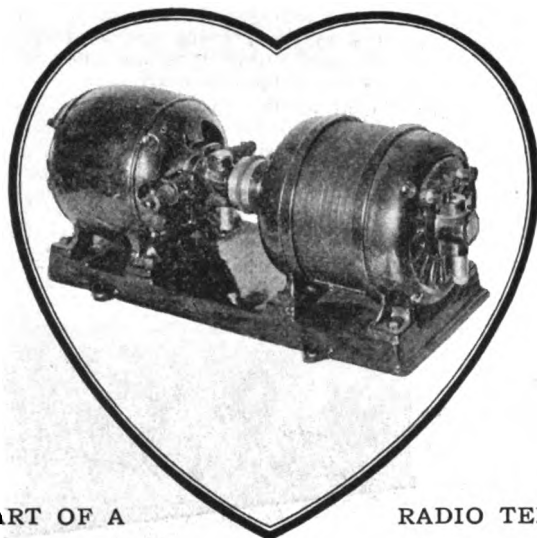
THE COLIN B. KENNEDY COMPANY

INCORPORATED

RIALTO BUILDING

SAN FRANCISCO

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A

RAY-DI-CO

(Reg. U. S. Pat. Office)

MOTOR GENERATOR UNIT

Has YOUR radiophone HEART FAILURE?

A sturdy radiophone, like a sturdy man,
must have a strong HEART.

A Ray-Di-Co. motor generator is a sure cure.

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6 volt "DYNAMOTOR"

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At our new retail salesroom we carry a complete line of

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and other STANDARD makes of apparatus,
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Aluminum and Copper Antenna Wire

Silicon Bronze, 7 strand wire 1½¢ per foot.
Switch Points, Binding Posts, Brass Machine Screws,
Magnet Wire, Remler Knobs and Rotary Switches,
Corwin Knobs and Dials.
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Radio Corporation Grid Leaks, 30 values.
Grid Leak Mountings. Electrode Insulators.
Bakelite and Formica Tubes, Sheets, Rods.
45 Volt tapped "B" Batteries.

Wireless Supplies of all kinds. Goods postpaid.
Write for prices.

AMATEUR WIRELESS SUPPLIES

V. C. DeChesne,

Gridley, Cal.

an' a pile-of-red-hot chow. 'He wire-
lessed the news over to the Port Moller
operator, and we started right away.'

"A few minutes later I hears one of
the Aleute hands of the tug pow-wowin'
with old Muckashouk.

"Wirelessuck tung-ugh-tuck chi Pirate
Cove Wirelessuck—Pirate Cove Wirelessuck
chuckalooden chi Port Moller Wirelessuck.
Adockoo whee-joolen gasolinuck 'Empress'
tyloonuck. Wirelessuck asisth-tuck!"

"Gulpin' down a horse-bite of canned
mule, old Muckashouk starts to answer
—an' then discovers that I'm watchin'
him.

"'Humbug!' he growls."

RADIO NOVICE PENALIZED

Because he deemed the 200-meter
wave length allowed amateur wireless
operators too congested, John Imsand,
40 Goethe street, Daly City, Calif., sent
out radio messages on 240 meters, where
things were not quite so crowded. But
government radio inspectors who hap-
pened to be listening in on 240 meters
heard Imsand sending out pleasantries
through the air and now his wireless sta-
tion at his home has been ordered closed.

U. R. T. A. ELECTS NEW OFFICERS

At the second annual convention of
the National United Radio Tele-
graphers' Association, held in New York
City August 15 to 18, the following of-
ficers were elected for the ensuing term:
National president, Claude C. Levin; na-
tional first vice-president, H. L. Le-
Compte; national second vice president,
R. H. Murphy; national third vice-pres-
ident, J. C. Mitchell; national secretary-
treasurer, Alfred De Silva, and eight
members from the various districts to
comprise the executive board.

NEW MOTORS FOR ALL PURPOSES
STANDARD MANUFACTURERS
PROMPT DELIVERY

ALL SIZES UP TO 5 H.P.

We Specialize In Small Motors & Generators
ALL PHASES AND FREQUENCIES IN STOCK AT ALL TIMES
Largest exclusive Mail Order Small Motor dealers in the world.

CHAS. H. JOHNSTON, Box 38, West End, Pittsburgh, Pa.

WIRELESS, TELEPHONE GENERATORS
500 VOLT - 100 WATT - 3400 R.P.M.
FOR MOUNTING MOTOR GENERATOR SETS.

\$28.50 EACH

WRITE FOR CATALOG

Radio Amateurs of COLORADO,
UTAH NEBRASKA and WYO-
ING, do you know

DENVER

HAS THE LARGEST WIRE-
LESS SUPPLY STORE in the
MIDDLE WEST.

We are Exclusive Agents for DeFOR-
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Complete stock of MURDOCK, FIRTH,
CLAPP-EASTHAM and all standard
Radio Supplies, from which we make

IMMEDIATE DELIVERY

Write for our Bulletins and Price List.
We will give prompt Mail Order Ser-
vice by Parcel Post or Express, as
requested.

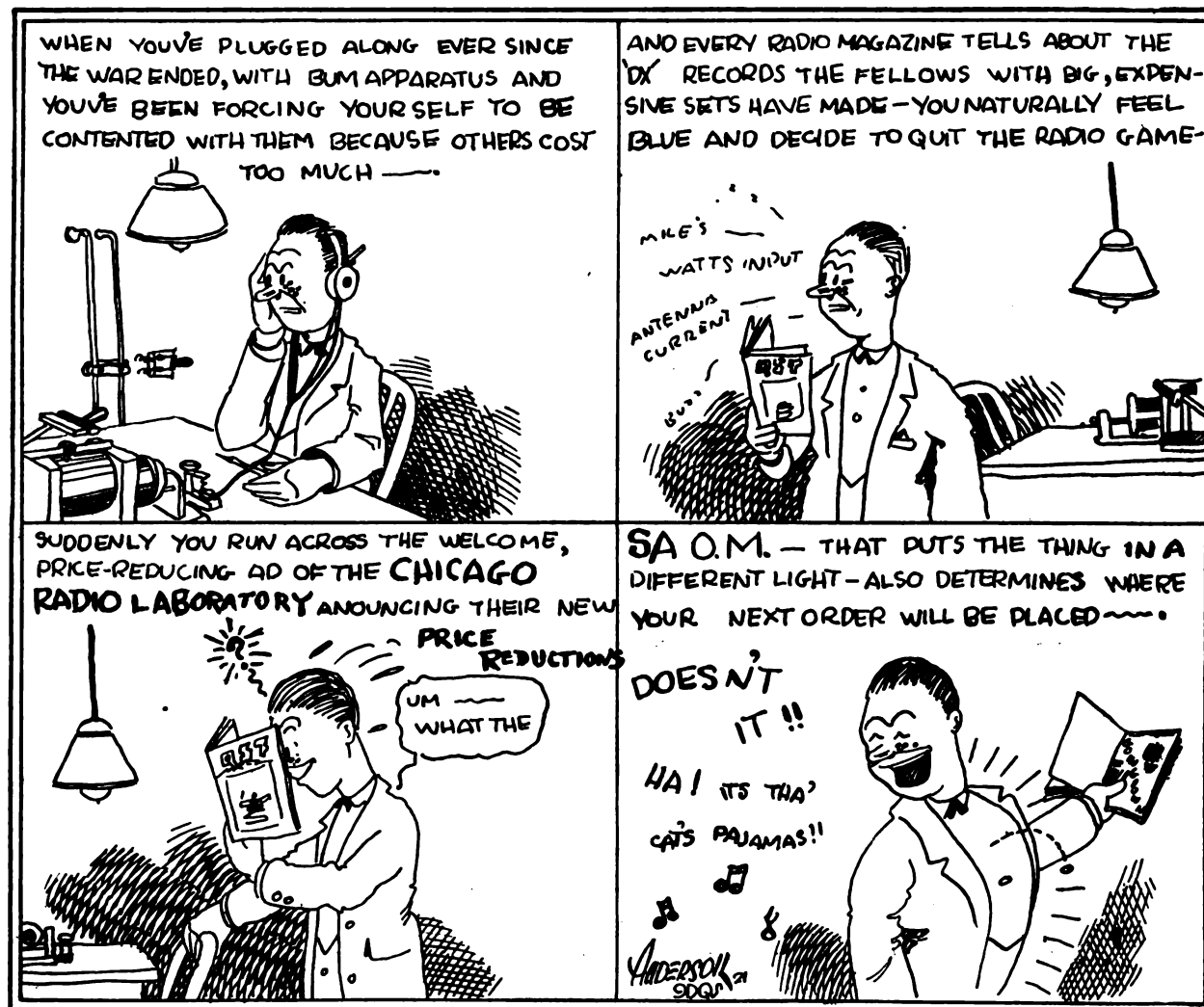
Our "REYNRAD" Short-wave Coils
are best on the market, \$2 each.

REYNOLDS RADIO CO., Inc.

613 19th St.

DENVER, COL.

Don't Feel Blue—Let the Tubes on your C. W. Set do that!



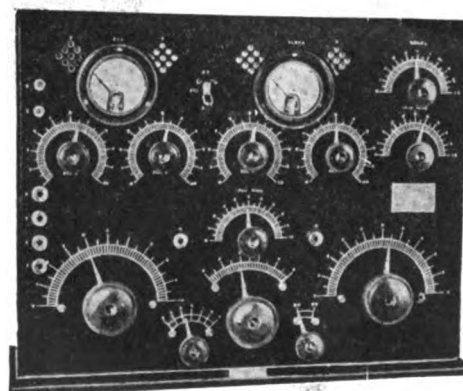
"OUR LATEST"

"Z-NITH" RADIO APPARATUS

Has Been Reduced in Price Approximately
15 Per Cent on Each Instrument.

These prices represent
our contribution to-
ward the reduction of
the "High Cost of
Radio."

Instrument	Old Price	New Price
Z-Nith Regenerator	\$ 65.00	\$ 55.00
Amplifon AGN-1	75.00	64.00
Amplifon AGN-2	105.00	89.25
Amplifon AGN-3	135.00	115.00
Hyrad Disc	12.00	10.50
Hyrad Non-Syn. Gap	65.00	49.00
Hyrad Syn. Gap	125.00	105.00
Jeweler's Time Rec.	75.00	69.50
Multiceiver MC-3	265.00	236.00
Altaceiver CW-3	300.00	254.00
C. R. L. Regenerette	12.75	12.75
One-Step Amp. AM-1	33.50	28.50
Two-Step Amp. AM-2	65.00	55.00
Detector AD	20.00	17.00
Detector ADP	30.00	25.00



Z-NITH MULTICEIVER MC-3

The most complete, ef-
ficient and flexible re-
ceiver ever designed.
Described in detail in
our Catalog F-21.
Write for it.

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Office and Factory, 6433 Ravenswood Ave.

Testing Station 9ZN—5525 Sheridan Road

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Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser,
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

SEATTLE

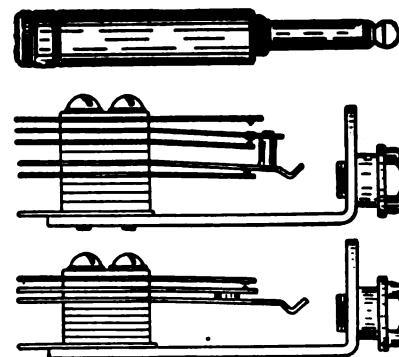
WASHINGTON

FILAMENT CONTROL JACKS

(Continued from Page 101)

The function of the filament control jack is to obviate the necessity for filament current switches for detector and amplifier tubes. It also eliminates switches between amplifiers and between amplifier and detector, a saving in filament current which is wasted under customary operating conditions by leaving bulbs burning while not in use. Pushing in the phone plug connects the receivers to the circuit at the detector or desired stage of amplification and lights the bulbs, all in one operation.

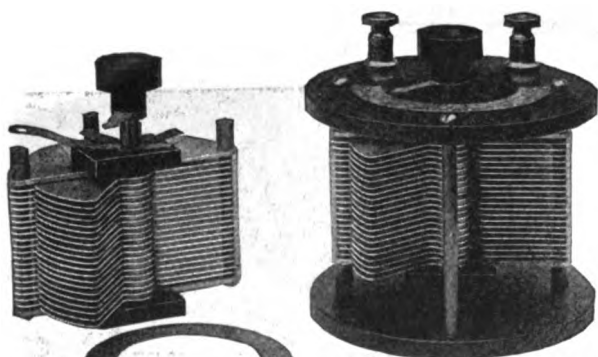
If Fig. 1, it is desired to use detector simply push receiver plug in jack M and first bulb will light. If first stage of amplification is desired place plug in jack N, when both detector and first step amplifier bulbs will light and the station will operate with one step amplifier. Similarly for added stages of amplification.



Filament Control Jacks.

The three points on the left (assuming the jack to be in a vertical position with the connections on the bottom.) are (Continued on Page 120)

"ILLINOIS" THE RELIABLE MADE RIGHT - STAYS RIGHT



STYLE No. 1.

STYLE No. 2.

Three Styles: No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



VERNIER

With Style No. 1, we will, if desired, furnish 3-inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center shaft, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave.

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By special mutual arrangement between the publishers, the three big radio magazines of the country are made available for a limited time at a special rate when ordered together—

"Pacific Radio News," pioneer journal of Western Radio development;
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All for
For
One Year

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Don't miss this opportunity to secure the best contemporary radio literature of America coming to your door every month for a year—at a saving in real money, too. Send in your subscription today!

Pacific Radio News

151 Minna St., San Francisco, Cal.

KENOTRON RECTIFICATION FOR C.W. TUBE TRANSMISSION



**KENOTRON
UV-216**
20-Watt Output
PRICE \$7.50

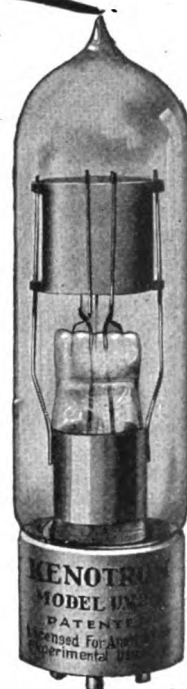
THE least expensive and the most satisfactory method of obtaining a direct-current source for plate-excitation is the use of A. C. with Rectifier Valves.

Two types are available for use with Radiotrons.

Kenotron Model UV-216 is especially designed to operate with Radiotron UV-202, the 5-watt-transmitting tube. Filament requires 7.5 volts at 2.35 amperes. The A. C. input is 550 volts. The output of this rectifier tube is 20-watts at 350 volts D. C.

Kenotron Model UV-217 is designed to operate with Radiotron UV-203, the 50-watt tube. The Filament requires 10 volts at 6.5 amperes. The A. C. input is 1250 volts. The output of this rectifier tube is 150-watts at 1000 volts D. C.

Our Standard Porcelain Socket, Model UR-542 at \$1.00 will fit Kenotron UV-216, while a larger socket of the same type, Model UT-541, price \$2.50, is required for Kenotron UV-217.



**KENOTRON
UV-217**
150-Watt Output
PRICE \$26.50

The Radio Corporation's tubes are covered by patents dated November 7th, 1905, January 15th, 1907, and February 18th, 1908, as well as by other patents issued and pending. Tubes licensed for amateur and experimental work only. Any other use will constitute an infringement.

Send 25 cents for the new C. W.
Transmission Book and Catalogue
of Radio Apparatus.

Radio  **Corporation**
of America

Sales Division, Commercial Department, Suite 1804
233 Broadway, New York City

UNIVERSAL

SORSINC

SERVICE

SORSINC Has Inaugurated a New Era in Citizen Wireless whereby orders for Amateur Radio Apparatus and parts are filled by men who KNOW every phase of Radio.

Our Branch Managers are the same men who for years have taken care of the installation and service of Commercial Apparatus on approximately 700 vessels.

Each Manager is an ex-Amateur, and you will find him ready to assist you with your Radio problems. That Commercial atmosphere will go far toward giving you a definite purpose and aiding you in your success.

FOR PROMPT AND ACCURATE SERVICE SEND YOUR ORDERS TO OUR NEAREST BRANCH STORE AND SAVE FROM ONE TO TWO WEEKS IN DELIVERY.

We are catering to you through the mediums of EXPERT RADIO MEN, and NATIONAL and INTERNATIONAL SERVICE.

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CLAPP-EASTHAM
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RECOMMENDATIONS

No. 30 Paragon Socket, condensite	\$ 1.00
No. 303 R-S Antenna Ammeter 0-2½	5.75
No. UM 530 Antenna Ammeter RCA 0-2½	6.00
No. UM 533 Antenna Ammeter RCA 0-5	6.25
No. UV 712 Amplifying Transformer RCA	7.00
No. 120A Fada Rheostat	1.25
No. F-500 DeForest Rheostat	1.65
No. PR 535 Rheostat for CW RCA	3.00
No. PR 536 A—Battery Potentiometer RCA	2.00
No. 21A Saco Clad Ampl. Trans.	5.00
Type C Baldwin Phones	13.75
Type E Baldwin Phones	15.00
Type F Baldwin Phones	16.25
No. UC 567 Tubular Condenser .00025 RCA	1.20
No. UC 568 Tubular Condenser .0005 RCA	1.35
No. UC 569 Tubular Condenser .001 RCA	1.50
No. UC 570 Tubular Condenser .0025 RCA	2.00



And When You Need a
B Battery Try A
SORSINC

6400 Milliamperes Hours
Extra Long Life
For Reception
For Transmission
"The Largest B-
known"
\$4.00

THE NEW RADIO CORPORATION CATALOG AND C. W. INSTRUCTIONS mailed to you for 25 cents. Enclose 4 cents additional to cover mailing. A real course.

DEALERS—We are Jobbing all the important lines. Write to our nearest Office for our Proposition.

SHIP OWNERS RADIO SERVICE, Inc.

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LONDON, 15 City Chambers, 65 Fenchurch St., E.C.

FILAMENT CONTROL JACKS

(Continued on Page 118)

used for the filament. The negative pole of the "A" battery on the three stage amplifier is connected to the four jacks at the farthest point on the left. When the plug is out this point is disconnected. The second point from the left in all jacks, except the last, is connected to the rheostat. The third point from the left merely serves to carry the positive connection along to the next bulb.

When the plug is inserted for use of the detector the "A" battery circuit is closed, the phones are placed in the plate circuit and the connection to the amplifying transformer broken. When the plug is removed from jack M the plate circuit is made to include the primary of the amplifying transformer the bulb circuit is broken and the positive pole connection is carried on the successive tubes.

When the plug is inserted in jack N the bulb circuit is closed, lighting both the detector and amplifier bulbs; the primary of the amplifying transformer for the next stage is disconnected and the receiver connections made in its place. This process continues throughout the stages of amplification until the last, when of course there is no occasion to put the phones in the place of the primary of the next amplifying transformer. Hence two points of the jack are removed and in this case the low voltage circuit is closed and phones placed in the plate circuit when the plug is inserted.

6ZR IS MANAGER OF MEYBERG STORE IN LOS ANGELES

Hall Berringer, formerly 6ZR of Burlingame, Cal., has been appointed manager of the new Leo J. Meyberg store in Los Angeles. He will shortly be back on the air with his TNT spark.

To all SUNKIST RADI-O-ITES

Finding that the express charges on the heavier goods from the East are so high as to eat up the profits, I withdraw my offer to deliver in California free of transportation charges.

Paul F. Johnson,
ALTADENA RADIO LABORATORY,
Altadena, California.

NICKEL PLATING

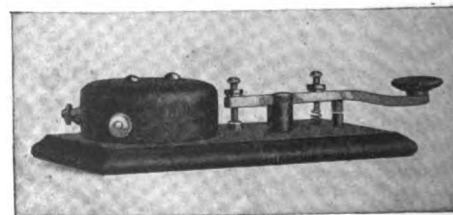
Done right. Priced right.

Send us your parts today we will ship tomorrow. All kinds of radio and electrical parts made to order at reasonable prices. Special parts given special attention.

A. & S. SPECIALTY CO.

818 S. Ave., Wilksburg, Pa.

LEARNERS SETS



With code, instructions, lever key (all brass) and the AJAX BUZZER \$1.80. Sending keys bakelite base, lever type, all machined brass, \$1.50. Unmounted \$1.00.
60c—AJAX HYTONE BUZZERS—60c external tone adjustments. All postpaid.
AJAX ELECTRIC CO., 8 Palmer St., Cambridge, 38, Mass.

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4"x4"x3½"	1½	\$5.00
2	.0006 m. f.	Mounted	4"x4"x2½"	1½	4.50
3	.0011 m. f.	With Dial	4"x3x4"	2	4.75
3	.0011 m. f.	Without Dial	4"x3x4"	2	4.35
4	.0006 m. f.	With Dial	4"x3x3½"	1½	4.25
4	.0006 m. f.	Without Dial	4"x3x3½"	1½	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

The Power Ratings of Magnavox Radio Loud Speakers

MAGNAVOX ELECTRODYNAMIC RECEIVERS ARE LIMITED ONLY BY THEIR CONSTRUCTION AND ELECTRICAL CONSTANTS IN THE AMOUNT OF POWER THEY WILL CONVERT INTO SOUND. THEREFORE WE HAVE RATED THEM ACCORDING TO THE INPUT THEY CAN RECEIVE AND SUCCESSFULLY TURN INTO SOUND—EITHER FROM SIGNALS OR FROM RADIO TELEPHONE SPEECH OR MUSIC.

The Type R-3 Radio Magnavox is a 5 Watt Instrument at \$45
The Type R-2 Radio Telemegafone is a 20 Watt Instrument at \$110

This also means that with their rated input the Type R-3 may be heard 1 mile under good conditions, and the Type R-2 be heard 3 miles under the same conditions.

The way to get a **Power** input to utilize the enormous converting characteristics of Magnavox is to use from 100 to 500 volts on the plate of your two-stage amplifier—then you will hear your signals with a strength not approached by any other type.

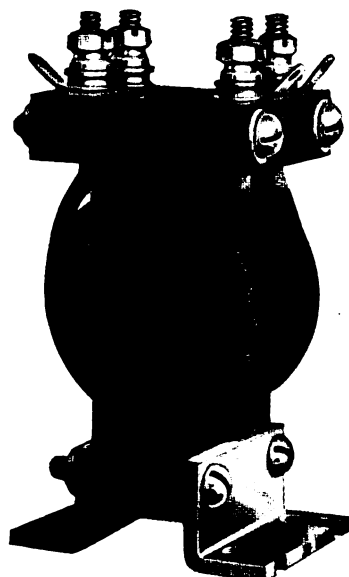
CAUTION: Do not use 4 or more stages of amplification, use only two or three with high plate voltage and be careful that you do not put your phones or loudspeakers made from phones in the output circuit, for you will surely burn them out. You need have no fear of even 750 volts for the Magnavox, as they will carry it successfully.

THE MAGNAVOX COMPANY

OAKLAND, CALIFORNIA

New York Office: Penn-Terminal Bldg., 370 7th Ave., New York City

Federal Standard Radio Accessories



No. 226-W—Type A
Audio Frequency Transformer

ANNOUNCING

**A Material Price Reduction
on the Famous Federal
Amplifying Transformer
Reduced Price \$7.00**

**Federal 226-W Transformer will give Maximum Amplification
with all types of Standard Tubes on the market**

*Write for Bulletin 102-WB and C Circular
describing New C-W Accessories*

Ask Your Dealer for Federal Products. If he does not have them, tell us his name

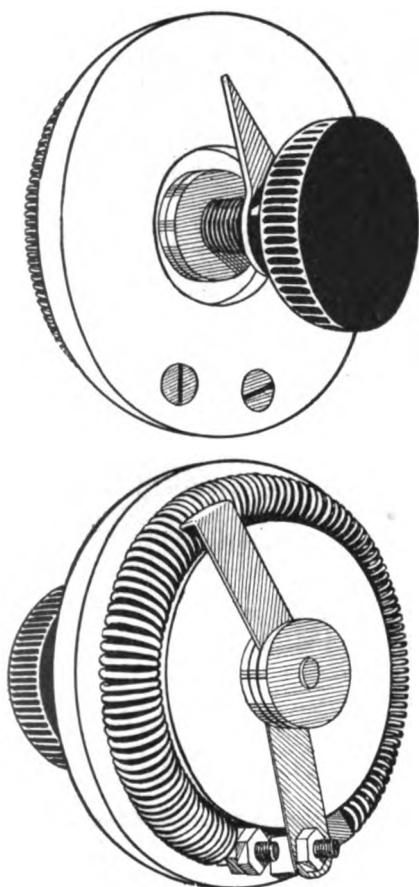
Federal Telephone & Telegraph Company

BUFFALO, NEW YORK, U. S. A.

MANUFACTURERS OF STANDARD RADIO ACCESSORIES

When writing to Advertisers Please mention Pacific Radio News

SHRAMCO -- REO --



For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

BACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2 1/4 in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

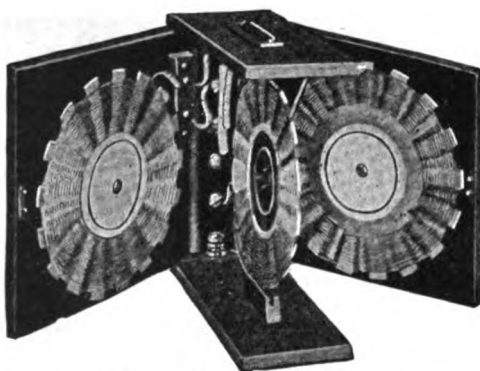
For your vt. Detector and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2 1/2 in. base.

SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K." listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

SPIDER WEBS



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

WONDERFUL
REGENERATIVE
SIGNALS

NO MAGNETIC
LEAKAGE

\$5.50
Plus 30c
Postage

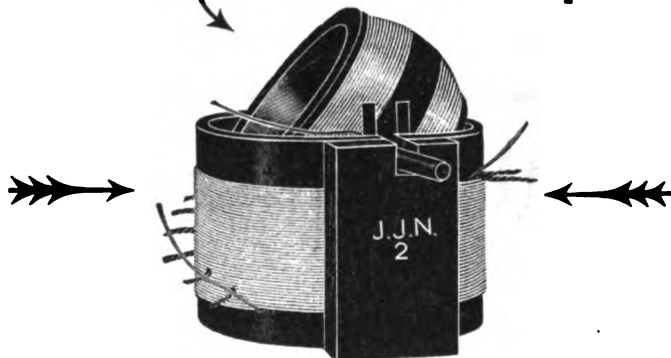
HERROLD LABORATORIES

"Everything for the Amateur"

467 SO. FIRST STREET

SAN JOSE, CALIF.

\$4.00 **LOOK** **\$4.00**



The New Type J. J. N. 2, Variocoupler

12 Taps on Primary; Units and Fives

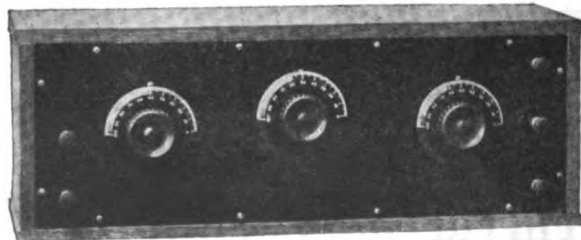
Is easy to mount. The best at a low price

Send Stamp for Catalogue P 21

DAVID KILLOCH CO.

57 Murray Street

New York City



THIS SHORT WAVE REGENERATIVE RECEIVER, WHICH WE SELL FOR \$30.00 will do the work of others that sell for \$50 to \$85. High-grade and without a peer. Send NOW for circular.

THE RADIOMART COMPANY

LONG BEACH, CAL.

When writing to Advertisers Please mention Pacific Radio News



This Name on Wireless Apparatus Spells "Highest Efficiency"

SIGNAL RADIO APPARATUS pleases the amateur because it is built to the exacting requirements of the professional radio-electrician. And everybody knows "the man in the business" KNOWS WHAT HE WANTS! THE SIGNAL LINE OF INSTRUMENTS is one of the oldest—and most complete; make sure by specifying "SIGNAL."

R-80 V. T. Control Cabinet

This is the first V. T. control unit on the market that is wired throughout in accordance with fundamental principles, and that has all binding posts marked correctly, as to use and polarity, so that the experimenter may make use of any circuit he chooses, and get maximum efficiency, as well as accuracy and ease of control.

We use our new V. T. socket in this instrument, which will take *any* of the standard four-prong tubes on the market either detectors or oscillators.

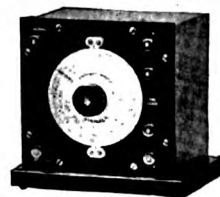
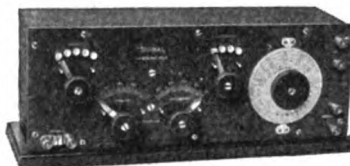


R-37 Short-Wave Tuner

This instrument is the most efficient, short-wave tuner on the market, being designed on scientifically correct principles.

We use special H. C. coils, with taps at the proper points for controlling the wave-length range, and a small condenser with just enough capacity to cover the steps of inductance. This combination is free from the inherent defects of tuners using either inductance, alone for tuning, or capacity alone, and the results obtained with this tuner, as well as its ease of control, are remarkable.

There is more "Radio" value in "Signal" apparatus, than any so far produced for the money.



R-44 Primary Series Condenser

For the *best* results, and *real* satisfaction in C. W. work, use our special condensers with our new dial, equipped with wave-length scale, so that your set may be calibrated with your own and aerial and ground system.

This allows close and accurate tuning, as well as the duplication of your settings, and makes your receiver serve as a wave-meter.

No other apparatus on the market has this feature to offer.

You should have the *Signal Wireless* catalog. Write for it today; it's free. Address

Signal Electric Manufacturing Company
MENOMINEE, MICHIGAN

FORMICA

SHEETS - TUBES - RODS

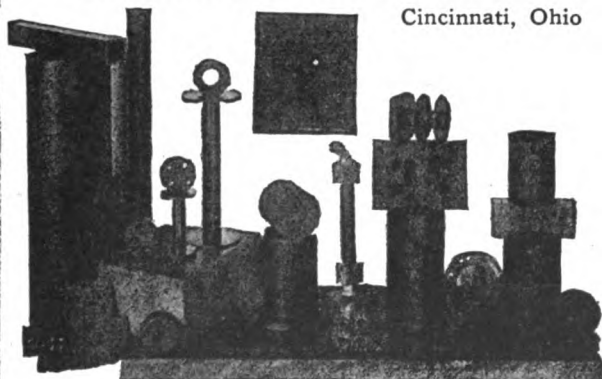
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

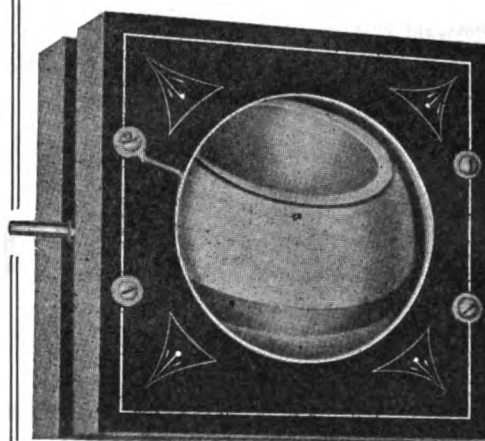
Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:
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Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco; Wireless Shop, 511 W. Washington St., Los Angeles; Northwest Radio Service Co., Seattle, Washington.



**Demand
the
Best!**

Our products
are unex-
celled in
quality and
very low in
price.

VARIOMETERS

You can't go wrong when you buy our Variometers, because they are recognized to be perfect in every respect. Well made, strongly constructed, and perfectly balanced.

\$4.50 Postage 25c
Guaranteed Fully

VARIOCOUPERS

Our Couplers are the kind that can be easily mounted, easily wired and they run as true as a die. Nothing but the best material used throughout.

\$3.50 Postage 25c
Very Selective

These instruments regularly sell for \$5.50 and \$4.50. They are specially priced for a limited time. All orders must show that they were mailed by October 10th.

Send
for List
of Used
Apparatus

Dial-Rheostats ... \$1.75
Break-in Keys ... \$9.75
Amplifying Trans. \$3.75

Watch
for
Our Next
Month's Ad

WESTERN WIRELESS WORKS
5534 Edgerly St. Oakland California

When writing to Advertisers Please mention Pacific Radio News

—Standard, up-to-the-minute RADIO Material—COMPLETE Line

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for
Our
Price
List

Regenerative Sets,
Audion Bulbs for every purpose,
Special Antenna Wire,
Insulators, Dials, Variometers,
Condensers of every kind,
Radio Magnavox, Amplifiers and Parts.

1014 Sixth

Sacramento



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ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bldg., San Francisco, Calif.

ONE KW TRANSMITTER complete for sale; also several head sets, etc. TRUMBULL, 365 McGraw, Seattle.

WE HAVE—Firco apparatus, Baldys, Sacclads, etc. Chi-Rad variometers knockdown \$4, set up \$5. Get our little set. Variometer, wavemeter, receiver, and only \$9 with Crystal detector, \$10. Always in use. Murdock's type 66s. Write! Port Arthur Radio Laboratory, 2048 Fifth St., Port Arthur, Texas.

FOLLOWING FOR SALE: Complete station. 600-foot aerial, pole, 1-4 KW transmitter. Receiver and Brandes Transatlantics. Also 6-volt, 40-amp Exide Battery, Blitzen 43-plate variable; 2 old type Audiotrons. \$60.00 cash. (Buyer pays express or extra charges). G. R. Mackin, 88 Peralta Ave., San Francisco, Cal.

STOP! LOOK! AND ACT! V. T.'s. With each Radiotron UV200 V. T. detector or A-P Moorhead V. T. detector or Radiotron U. V. 201 V. T. Amp. or A-P Moorhead V. T. amp., we will supply free of charge your choice of either a Murdock V.T. socket, improved contact type, or a Remler Bakelite smooth running rheostat, latest type. Radiotron UV200, \$5. Radiotron Amp. V.T. UV 201, \$6.50; Moorhead A-P detector \$5.00; Moorhead A-P Amp. V. T., \$6.50; Remler Bakelite rheostat, latest type, \$1; Murdock V.T. socket, \$1. We absolutely guarantee the foregoing apparatus. Only new and high grade equipment carried in stock. All orders are filled within twelve hours and shipped postpaid and insured, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. P, Abilene, Kansas.

DUBILIER CONDENSER. Practically new. 14,000 volts. .007 mfd. \$22.00. L. E. Martin, 100 Olive Ave., Fresno, Cal.

SHORT WAVE REGENERATIVE SET. Has two Radio Shop Variometer, Wireless Shop Var.-Condenser, oak cabinet, dark finish; heavy Bakelite panel, Remler dials; special circuit. All tuning done on variable condenser. Highly efficient. Fully guaranteed. \$25.00. Box 100, Pacific Radio News, 151 Minna St., San Francisco, Cal.

FOR THE LOVE OF MIKE, read this list of bargains in used radio apparatus that we have for sale this month:

One Short Wave Regenerative Receiver, used only two months. In first class condition. Worth \$50, sell for \$25. Postage on 11 pounds extra.

One Murdock Variable Condenser. Regular price \$5. Sell for \$3. Postage 25c extra.

One Murdock Oscillation Transformer. Regular price \$5. Sell for \$3. Postage 25c.

One A.C. Ammeter, zero to 5 scale. Regular price \$8. Sell for \$4. Postage 25c, including insurance.

One 1-stage Amplifier, complete with bakelite panel, tube socket, amplifying transformer, binding posts, rheostats and wiring. Ready for use. Shop worn only slightly. Sell for \$10. Postage 25c.

One Audion Control Panel. Bakelite panel, 8 binding posts, Murdock VT socket, Remler Grid Condenser, Remler Rheostat. Regular price \$10. Sell for \$6.50, prepaid.

Besides this list of slightly used apparatus we have several two and three-stage amplifiers. A dandy two-step and detector for \$35, in beautiful oak cabinet, bakelite panel, complete in every detail, without tubes or batteries. One Honeycomb receiver with set of six coils. Good for Pacific Coast radio telephone concerts. This receiver has two variable condensers, oak cabinet, bakelite panel, series-parallel condenser switch, all binding posts and wiring. Sell to first person who sends \$40 money order.

One C. R. 1 Grebe set complete with V. T. tube and Edison "A" battery. \$70.

Get on our mailing list at once to receive regular monthly circular of second hand supplies. Everything guaranteed to be in first class operating condition. No junk. Western Wireless Works, Used Apparatus Department, 5534 Edgerly St., Oakland, Calif.

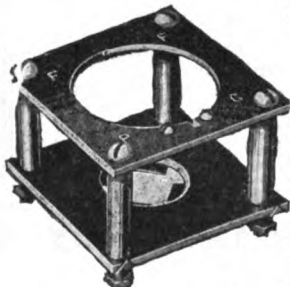
Something New

Made to Please You and
Priced to please your
pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy easily mounted socket that is heat proof, has bakelite-dilecto insulation, handy binding posts, etc., all for 75c.

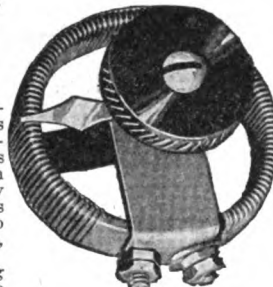
And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount, has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

The Wilcox Laboratories
LANSING, DEPT. J., MICHIGAN



Type 126, Tube Socket

Price **75c** Postpaid



Type 122 Rheostat

Price **90c** Postpaid

SATISFACTION!



That's what the STANDARD VT BATTERY is built to give. But to get it you must insist on the genuine STANDARD VT BATTERY, without modification of the name. Refuse and return the substitute.

Type	List Price
No. 7623—Small size	\$1.50
No. 7625—Large size	2.65
No. 7650—Large size Bulb—	
Variable	3.50

Does Your Dealer Sell the Real Standard VT Battery?

RICHTER-SCHOTTLE CO., MFRS.

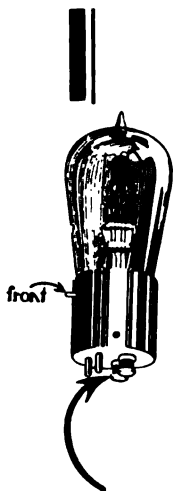
293 CHURCH STREET

NEW YORK, N. Y.

Pacent Electric Co., Sole Agents

150 Nassau St., New York City

Is there a Crepe On Your Vacuum Tube?



Your last vacuum tube would still be "alive" and the money you paid for a new one would be in your pocket if its filament had been protected with a

RADECO SAFETY FUSE

(Patent pending)

Because of the insignificant cost, and absolute protection against high amperage, RADECO Safety Fuses are now a standard part of every efficient wireless set.

NOW, while your tube is in perfect condition, pin one dollar to this advertisement and be guarded against all future vacuum tube expense.

We carry complete stock of all radio apparatus. Order from any standard catalog.

Radio Equipment Co.

630 WASHINGTON STREET,
Boston, Mass.

New Price

RADECO Safety Fuses come in $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ and 3 amp. sizes. Slip directly on filament terminals of any standard bulb used in any standard socket. Sent Postpaid.

Four for

\$1.00

—All That It's Name Implies—
We've changed our name—

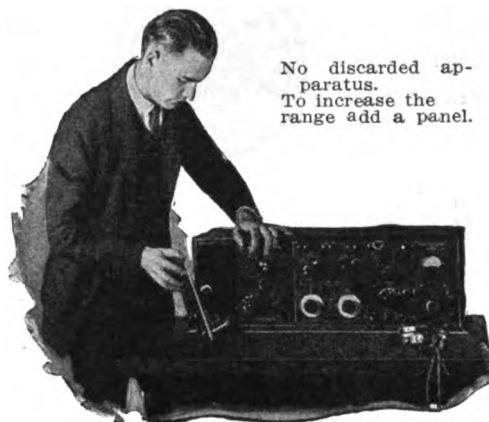
RADIO

We've broadened our scope—
We've increased everything—
—Except the price.

RADIOPHONE "Interpanel System"

REG. U.S. PAT. OFF.

Is the Last Word in Wireless



No discarded apparatus.
To increase the range add a panel.

No system of wireless even approaches it in efficiency and low cost. It was invented by Dr. DeForest, and is built under the keen, watchful eye of the inventor.

The "Interpanel" is a long step forward in radio systems. It is the application of the unit idea of sectional bookcases. Unlike other systems it embodies the transmitter as well as the receiver. All you have to do in order to lengthen your range is to add a unit or "panel" without discarding a single piece of apparatus.

The DeForest "Interpanel" Radiophone is for CW transmission of both telephone and telegraph—the only up-to-date method of radio transmission.

There can be only one best—and the best is always the cheapest, particularly in radio apparatus. There is only one "Interpanel."

FOUR PANEL STATION

Complete set of four units, mounted horizontally

- (1) Complete radio "Midget" transmitter. Phone sending range 30 miles (OT-3).
- (2) Complete short wave tuner, 150 to 600 meters (MT-100).
- (3) Complete audion control, especially for gaseous tubes (MP-100).
- (4) Complete one-step amplifier (MP-200).
- (5) Any additional step of amplification may be added.

Write for catalog. Address Dept. 108A.

DeForest Radio Tel. & Tel. Co.

Manufacturers of Highest Grade Radio Apparatus

1415 Sedgwick Ave., New York City

Pacific Coast Distributors:

Henry M. Shaw, Pacific Radio Supplies Co., 638 Mission Street,
San Francisco, Cal.

If It's a Radiophone, It's a DeForest Invention

A MULE Could not kick a msg. a 100 miles with all its KICKS

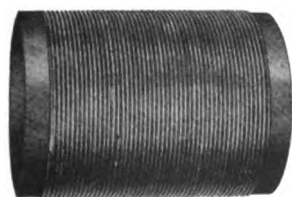
But—10 Watts of CW easily
sends it 10 times that

FAR

FOR RESULTS, EFFICIENCY AND SERVICE USE

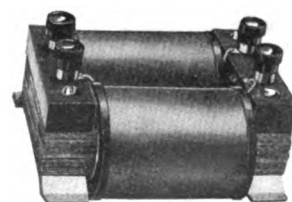
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APPARATUS



C. W. Inductance
Type SR-7

Single or two coil winding \$5.00
Threaded Formica Tube only 3.75



C. W. Choke Coil
Type SR-6

If your dealer can not supply you, send us his name.
STANDARD RADIO CO., LOS ANGELES, CAL.

150 M.A. \$6.00
500 M.A. 7.50

RADIO APPARATUS

*Distributors of Reliable Radio Apparatus to Schools, Colleges, Radio Clubs and Experimenters
All Over the World!*

"PITTSO"

SERVICE FILLS ORDERS
FOR "GREBE RADIO" ANYWHERE!
THAT APPARATUS OF PROVEN
MERIT!



"PITTSO"

SERVICE DISTRIBUTES RADIO
CORPORATION'S PRODUCT ALL
OVER THE WORLD! TRY
US AND SEE!

AMPLIFYING TRANSFORMERS

No. UV-712 Radio Corporation	\$7.00
No. P-1 Amrad, mounted	4.50
No. P-2 Amrad, unmounted	3.75
No. QO Clapp-Eastham, semi mounted	4.00

AMPLIFIERS

No. DA Westinghouse, Detector and two stage, in beautiful cabinet.....	65.00
No. RORR Grebe two step with automatic filament control, a beauty.....	55.00
No. RORD Grebe Det. and two stage with automatic filament control.....	75.00
No. P-1 Amrad two stage in 10x5 cabinet, splendid value	32.50

AUDION CONTROL PANELS

No. RORH Grebe in Cabinet, with tickler connections, hinged cover.....	17.00
No. RORA Grebe in cabinet with hinged cover, special value at	9.75
No. 330 Remier, with "A" Bat. Potentiometer, just out	8.00
No. P-1 Paragon, moulded type.....	6.00

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"Pittsco" No. 14 Hard drawn copper, 80 ft. per lb., per lb.....	0.40
500 ft. special value at	2.25
"Pittsco" 7 strand No. 22 tinned copper, 65 ft. per lb. Per ft.....	0.01
500 ft. special value at	4.50
"Pittsco" 7 strand No. 20 Phos. Bronze, per ft.	0.02
500 ft. special value at	8.50

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No. P-3 Porcelain cleats with screws for No. 4 wire, per pair	0.10
No. P-4 "Pittsco" ground clamp.....	0.20

"B" BATTERIES

No. 7623 Standard, 22.5V small.....	1.50
No. 7625 Standard, 22.5V large	2.65
No. 7650 Standard, 22.5V variable	3.50
No. 763 Eveready 22.5V small	2.25
No. 766 Eveready variable 16½ to 22½ volts, large	3.00
No. 766 Eveready, 22.5V, large.....	3.00
No. P-1 Sorsinc, 22.5 Volts, large, and extra long life	4.00

CONDENSERS (Fixed mica type)

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No. ROCC Grebe .0002MF	1.00
No. ROCD Grebe .0005 MF	1.20

GRID LEAKS

No. MW-1 Radio Corporation, ¼, 1, 1.5, 2, 3 or 5 megohms, each complete	1.25
Grid leaks only	0.75
Bases only	0.50

HOT WIRE METERS

No. P-1 Roller Smith, 0-2.5 flush mounting. A real value for.....	4.75
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No. 127 General Radio, .5, 1, 2.5, 5 or 10 amps, flush or front mtg. each	7.75
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LOUD SPEAKERS

No. R-3 Radio magnavox, latest model	45.00
No. P-1 Phonotron, just out.....	45.00
No. P-2 Vocaloud, station type.....	30.00
No. P-3 Vocaloud, Laboratory type.....	25.00

PLUGS

No. 50 Pacent Universal type.....	2.00
No. 1428-W Federal, brass	2.00
No. 1428-W Federal, silver plated.....	2.50

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No. CR-3 Grebe "Relay Special," 175-680 meters	65.00
No. CR-3A Grebe 175-375 meters, with tube control, complete set, a special value at	35.95
No. CR-5 Grebe 175-3000 meters, "Super-special," complete set, ideal for phone, spark and time signals.....	80.00
No. CR-8 Grebe "Relay Super-special" 150-1000 meters, complete set. Just out!	80.00
No. RA Westinghouse, 180-700 meters, very selective, beautiful cabinet.....	65.00
No. RC Westinghouse, RA Receiver, and DA Det. Amplifier combined in one cabinet, splendid unit, compact	125.00

SOCKETS

No. MW-1 Radio Corporation, bakelite	1.50
No. UT-541 Radio Corporation for UV-203 tube	2.50
No. 156 General Radio, new price.....	1.50
No. 550 Murdock, moulded	1.00
No. P-1 Amrad, new price	0.75

RECTIFYING DEVICES

No. UV-216 Radio Corporation, 20-Watt "Kenotron" rectifier, for UV-202 tubes	7.50
No. UV-217 Radio Corporation, 150 Watt "Kenotron" rectifier, for UV-203 tubes	26.50
No. P-1 DeForest, 20 Watt rectifying tube, for use with 5 watt tubes 7.00	

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No. 56 Murdock, double, 3000 ohms.....	6.00
Brandes, Superior, double	8.00
Brandes, Transatlantic, double	12.00
Brandes, Navy Type, double	14.00

POTENTIOMETERS

No. PR-536 Radio Corp. "A" Bat. type	2.00
No. 93 Remier "A" Battery type.....	0.75

VACUUM TUBES

No. UV-200 Radiotron Detector	5.00
No. UV-201 Radiotron Amplifier	6.50
No. UV-202 Radiotron 5 Watt transmitter	8.00
No. UV-203 Radiotron 50 Watt transmitter	30.00

No. UV-204 Radiotron 250 Watt transmitter	110.00
---	--------

Note: All Radiotrons sent postage and insured prepaid anywhere in U. S. A. Send us your orders for Radiotrons!

RADIOPHONE AND CW. APPARATUS CW. POWER TRANSFORMERS

Acme 50 Watt 350 Volts, mounted.....	15.00
" 50 " 350V., unmounted.....	12.00
" 200 " 350-550V. mounted.....	20.00
" 200 " 350-550V., unmt'd.....	15.00
" 500 " 1000-1500V. mtd.....	25.00
" 500 " 1000-1500V. unmt'd.....	20.00

CHOKE COILS

Acme single coil, 1-5 Hen. 150 MA.....	4.00
Acme double coil, 1.5 Hen. 150 MA	6.00
Acme single coil, 1.5 Hen. 500 MA.....	6.00
Acme double coil, 1.5 Hen. 500 MA.....	8.00

CONDENSERS (Variable)

No. 182-G General Radio .001 MF. unmounted, with dial	9.70
No. 3 Chelsea, .0011 MF. unmounted.....	4.75
No. 366-Int. Murdock, .001 MF. unmounted	4.25

FILAMENT HEATING TRANSFORMERS

Acme 75 Watt, mounted	12.00
" 75 " unmounted	9.00
" 150 " mounted	16.00
" 150 " unmounted	13.00

FILTERS

No. 170 Tuska, in cabinet	16.00
No. 21-AA Western Elec. 1000 Volt AC. condenser	2.50

INDUCTANCES, CW.

No. 181 Tuska Cap. Feed-back circuit	7.50
No. 182 Tuska split filament	10.00
No. 183 Tuska Grid tickler	12.50

METERS

Model 301 Weston, D. C. flush, 0-100, 0-150, 0-200, 0-300, 0-500 or 0-800 milli-amperes, each	8.50
Model 301 Weston D. C. flush, 0-1, 0-2, 0-3, 0-5, or 0-10 Amperes	8.50
Model 425 Weston, flush, Thermometer, 0-1, 0-2.5 or 0-5 each.....	18.75
No. P-1 Jewel, A. C. flush 0-15 volt-meter, ideal for power tubes.....	8.00

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No. 260-W Federal, hand type	7.00

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No. A-3 Acme fully mounted	7.00
No. 231 General Radio, new type.....	5.00

RHEOSTATS

No. 560 Murdock, moulded, new type for back mounting	1.00
No. 214 General Radio, 2.5 Amp. type, just right for 1UV-202 tube.....	2.50
No. 132 National Controller, 6.5 Amp. type, just right for 1UV-203 tube.....	4.50

RESISTANCES

Type HS Ward Leonard 5000 ohms.....	2.25
Type HS Ward Leonard 10,000 ohms.....	3.50

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SEND US YOUR ORDERS TODAY!

Send ten cents in stamps for Catalog No. 22. Over 100 pages, over 150 illustrations, over 800 items.

F. D. Pitts Co., Inc.

12 Park Square

Dept. E

Boston, Mass., U. S. A.

FRENCH INTERNATIONAL RADIO NET

The French government is working out a plan of world-wide wireless communication so as to be independent of all foreign-owned communication systems. From the home station at St. Assize, near Paris, it will be possible to reach all outlying French possessions, including Madagascar, Cochin China, and French Guiana. The largest direct distance will be 10,000 kilometers, from Paris to Saigon, 9,000 kilos from Paris to Madagascar 6,000 kilos from Paris to Brazzaville in West Africa. It is expected that automatic transmission and reception will allow a speed of 300 words per minute. The press rate will probably be one cent per word.

RADIO FUNERAL SERVICE

"Can you oblige me with a copy of the burial service?" This remarkable message was received by the wireless operator on the Cunard liner Carmania from a freight steamer 200 miles away, while the liner was about 300 miles west of Fastnet bound for Liverpool.

The message was despatched from the Canadian Trapper, in which a fireman had died on the voyage from Montreal to London. The wireless operator in the Carmania, which proceeded on her way at full speed, tapped out the service, word by word, in group messages of 150 words.

"M. P. M." —AT LAST!—

Perfect Detector Minerals

From Mine Direct to You
Brings in all music and signals, loud and clear.

TESTED { **GALENA**
CERUSITE
PYRITE

Box, assorted sizes, of either 50c postpaid. Large box, containing all sizes, \$1.50 postpaid. Large single piece, 25c.

MONEY-BACK GUARANTEE
Western Distributors

"Million Point Mineral" Co.

1254 Clay St.

San Francisco



A marvelously easy to understand instruction book on most advanced radio methods, because it describes in detail the unusual mechanical and electrical features and simplicity of the complete ABC line.

Sixteen pages, clearly illustrated, in two colors. Every price quoted in this catalog represents a new low level for apparatus of recognized quality.

Send 10c for latest ABC catalog, "Professional Radio Equipment at Amateur Prices." Request Catalog 10.

WIRELESS EQUIPMENT CO., Inc.
32 Austin Street, Newark, N.J.

By Popular Request

During the past few months we have received such a large number of requests from our readers to again give free premiums with subscriptions that we have decided to hold a new subscription drive. The apparatus given free to those who subscribe or secure subscriptions makes this new campaign an unusually attractive one. Many new premiums will be awarded. You can't go wrong on this offer as there are no strings attached to it.

Here Are Our New Propositions:

Offer "A"

Your choice of any Vacuum Tube on the market, not exceeding \$6.50 in retail price, will be sent to you absolutely free of charge if you send us **FOUR** subscriptions to "RADIO." 25c must be added for mailing charges.

Offer "B"

The well known McGuire Radio Lab. Variometer (Cesco Type) or the McGuire Variocoupler will be given free with three subscriptions to "RADIO." These instruments have enjoyed a wide and popular sale. 25c must be added for mailing charges. **YOU SAVE \$5.50 ON THIS OFFER.**

Offer "C"

A dandy Audion Control Panel of Bakelite. Has V. T. Socket, Rheostat and Grid Leak. 8 Binding Posts. Given free with five subscriptions to "RADIO." 25c must be added for mailing charges.

Offer "D"

5 Watt Power Tubes. Any standard make. One of these tubes given free with five subscriptions to "RADIO." These tubes are guaranteed to be absolutely new and standard in every respect. Mailing charges 25c.

Offer "E"

The new Parkin Dial-Rheostat, priced at \$1.75, sent to you free if you secure two subscriptions to "RADIO." This device is illustrated in our advertising columns. 12c must be added for mailing charges.

Offer "F"

Any one of the following popular radio books sent to you free if you secure two subscriptions to "RADIO": ARC Radio Manual (\$2.50), Elements of Radio Teleg. (\$2.50), Consolidated Call Book (\$1.50) These books sent postpaid.

Offer "G"

Polished Bakelite V. T. Socket (\$1.50) given free with one subscription to "RADIO." Mailing charges 12 cents.

Offer "H"

Bakelite and Mica Grid Condenser given free with one subscription to "RADIO." Standard size for any tube. Mailing charges 10c.

This Offer Will Be Withdrawn Shortly.

Hustle up those Subscriptions and get some
Dandy Radio Apparatus FREE!

Start Right Now!

DON'T WAIT 'TILL TOMORROW. YOUR FRIENDS MAY BEAT YOU TO IT.

PACIFIC RADIO PUB. CO., 151 MINNA ST., SAN FRANCISCO.

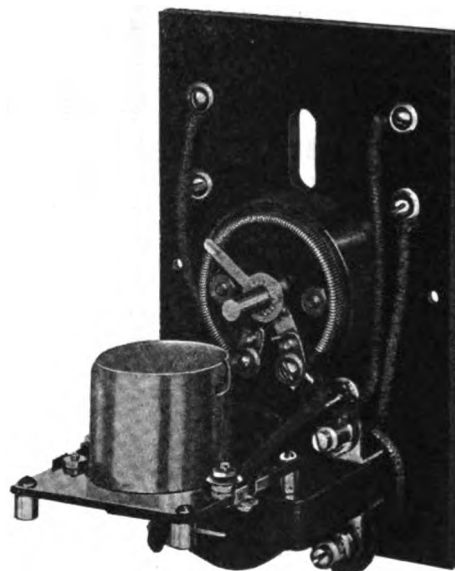
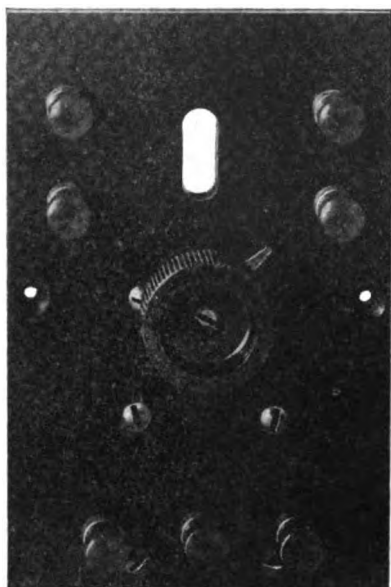
Send me **AT ONCE** the apparatus described in offer.....
I enclose the remittance of \$..... for the subscriptions andcents for mailing charges. You will enter the following subscribers to "RADIO" (formerly Pacific Radio News) for a full year each.

Name	Address
Name	Address
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Name	Address

When writing to Advertisers Please mention Pacific Radio News

BLISS

Unit Amplifiers and Panels



The most pleasing feature of this Amplifier is its compactness. All the instruments are mounted on the panel, and when mounted in a cabinet the panel is very easily removed, making all parts easily accessible at all times. The Transformers are General Radio make and are designed for the U. V. 202 Radiotron. Tube Sockets are standard, four-prong type. Panel is of well finished XX Bakelite and may be mounted on a base or in a cabinet with other units. Supplied without tubes or batteries. Wiring diagrams accompany each amplifier. AN IDEAL AMPLIFIER.

No. W-609 One stage Amplifier.....	\$15.00	No. W-612 Paragon Rheostat with Bliss Moulded Bakelite Knob	\$ 2.00
No. W-610 One stage Amplifier Panel.....	2.25	No. W-613 Insulated Binding Posts.....	.12
No. W-611 Tube Socket Mounted on back of Transformer	6.25	No. W-614 Complete set of Parts for W-609 Amplifier without wire and connections and not assembled.....	11.34



No. 301 BLISS Improved Switch, as illustration, Edgewise contact type with a genuine molded Bakelite Knob. 1 3-8 in. in diameter with a radius of 1 3-8 inches. Nickel plated lever.....\$.60

No. P-501 BLISS Moulded Bakelite Knob. 1 3-8 inches in diameter. POSTAGE PREPAID30

R. W. BLISS COMPANY

(Department P.)

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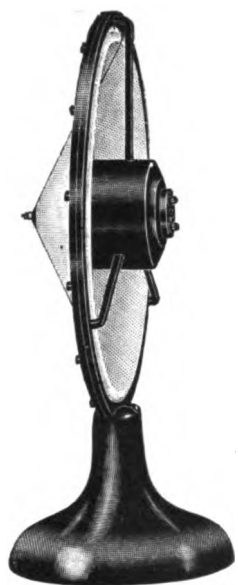
Wollaston, Mass.

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CONTINENTAL NEWS

OCTOBER, 1921

PUBLISHED EVERY MONTH IN PACIFIC RADIO NEWS BY CONTINENTAL RADIO AND ELECTRIC CORPORATION

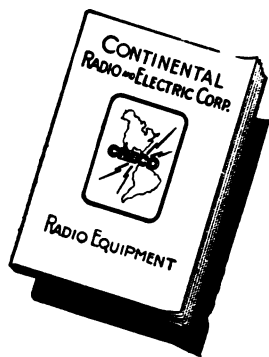


The PHONETRON

**Electric Sound Converter
More Than a Loud Speaker!**
Designed for both reception and wireless telephone transmission in place of a microphone transmitter.

Price \$45.00

ALL AMATEURS: Send for FREE descriptive leaflets about Paragon and Phonetron, the improved type of loud speaker. Creco Catalogue, 25 cents.



Do You Still Own a Quarter?

If so, and if you haven't already sent for the Creco Catalogue, that's the best way to invest it. 112 pages for a quarter, chock full of illustrations, descriptions, prices and all the radio apparatus you ever heard of. Also codes, abbreviations, tables, etc., that you will use daily. Be a sport. Risk a quarter on the best radio buy ever offered you! Anyway, you get credit for quarter on your first \$5.00 order, so you really get the catalogue for nothing. Your copy is all ready to be mailed. Slip your name and your quarter into an envelope now!

PARAGON

Scores Again

The hearty endorsement of Paragon R. A. Ten by leading amateurs speaks for itself. Last month we printed 2ZL8's enthusiastic letter. This month we have selected this similar statement from 2ZM as representing the opinions of hundreds of amateurs who have been astonished and delighted with the results they have secured.

"Wish to acknowledge receipt of my Paragon in good shape.

At the same time, I wish to say that I have gotten some surprising results, having read a number of DX stations that were never heard before, with my other receivers, even in the winter time.

I can truthfully say that the Paragon gives better results for all around amateur work than any receiver I have ever used, and will highly recommend it to my fellow amateurs.

(Signed) L. Spangenberg,
Radio 2ZM.

Ask your Radio Dealer

to show you a Paragon R.A. Ten regenerative receiver. If he hasn't one in stock, he will gladly get one if you ask him for it. The seals have now been broken to show you the splendid inside construction. Examine a Paragon carefully—convince yourself that these leading amateurs have not overstated one particle in their complete approval of Paragon results,—and that Paragon is well worth its \$85.00 price.



CRECO AMPLIFYING TRANSFORMER

*High in quality—
Low in Price:* **\$3.25**

In keeping with the usual Creco policy of distributing only apparatus of recognized quality, we offer an instrument of utmost mechanical and electrical efficiency, complete, ready for mounting, at an unprecedented low price. The Creco transformer was perfected with special reference to the needs of present day VTs. Important features are:

Unequalled audibility and amplification.

No holes in core, eliminating magnetic leakage.

All castings eliminated, etc., etc.

Such a simple, but efficient instrument should interest you at any price. But at the price of only \$3.25 (far lower than any other transformer) you will have to place your order quickly. Send for your Creco Transformers at once,—we cannot guarantee to keep the production up to the demand.

Honolulu
comes to
Continental
(read this letter)

Today I am sending you a radio again for some wireless supplies.

You are getting me delivery in fifteen days from the day I cable you, and that is some service to the center of the Pacific.

(Signed) CYRIL O. SMITH.
Permanent address, The Royal School, Honolulu, U. S. A.

Our Service Covers the World

**Order by mail
from New York's
leading Radio
Store**

It's a lucky thing for a good many radio stores, that amateurs are willing to blame the mails when they have to wait for their goods. You can order from Continental with the assurance that you won't have to wait. You can bank on it that your order will start toward you the day we get it. Everything listed in our catalogue is right here in stock—no delays. And there isn't much worth having, in radio, that isn't listed in the CRECO catalogue. It's not out of place to say that the Continental mail order stock includes worth while apparatus for every part of your station. No matter what wireless equipment you need, you can be sure that Continental has it, or will get it for you quicker than you could get it yourself.

Send your next order to Continental. No matter how large or small, it will be filled promptly, courteously, carefully. Please make all remittances by bank draft or Post Office Money Order, to avoid any possible delay.

CONTINENTAL RADIO AND ELECTRIC CORP.

**EXCLUSIVE WHOLESALE DISTRIBUTORS FOR
PHONETRON AND PARAGON R. A. TEN**

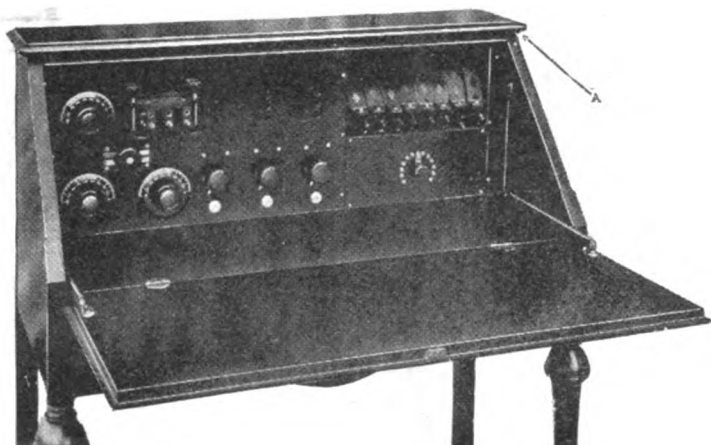
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Dept. G79 Warren St.

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New York City

SPECIAL SETS TO YOUR OWN SPECIFICATIONS



The beautiful walnut desk set illustrated is but a sample of our complete, low-priced "made-to-order" manufacturing service. What can we make for you?

If you can't buy **exactly** what you want ready-made, don't buy ready-made at all. Let us make **precisely** what you want, build it **just** the way you want it, and adapt it to fit your purpose **exactly**,—anything from the smallest part to the most complicated and elaborate set. The cost is low. What can we make for you **right now**? Let us submit a figure—that will cost you nothing, anyway, and we may have some valuable suggestions to offer.

Let our service department help you, too. Tell us your troubles. Even though you have purchased your apparatus elsewhere, this service is always at your disposal. Try it—**now**.

Of course, we also have a splendid stock of standard radio equipment and supplies, good apparatus at low prices, and deliveries—Bing! just like that.



We are Western Agents for the Radio Corporation of America and have Dealers Rights for New Discounts

FORMICA PANELS.

Our price for Formica Panels is 2¼c per square inch. All panels are cut accurately and the edges beveled. Polishing is done for 75c per square foot, and all panels are drilled for \$1 if center punched.

We have a complete stock of nickel plated machine and wood screws, round, oval, and flat, at 2c each. Sizes carried in stock, 4-36, 6-32, 8-32, and 10-32.

FOR DEALERS ONLY

Due to the increased demand it is getting harder every day to get Radiotron apparatus deliveries on time, and these deliveries will be slower and slower as the season advances.

The Fall rush will undoubtedly find your stock short in this popular line. Guarantee yourself against the loss of profitable sales by stocking a full line of Radiotron apparatus **AT ONCE**.

AMATEURS

Write for circulars on Radiotron apparatus, and IF YOUR DEALER CANNOT SUPPLY YOU, WRITE TO US DIRECT.

THE RADIO TELEPHONE SHOP

Pen Brand Products

RADIO EQUIPMENT

Designers - - - Contractors

175 Steuart Street
SAN FRANCISCO, CAL.

RADIO

FORMERLY PACIFIC RADIO NEWS

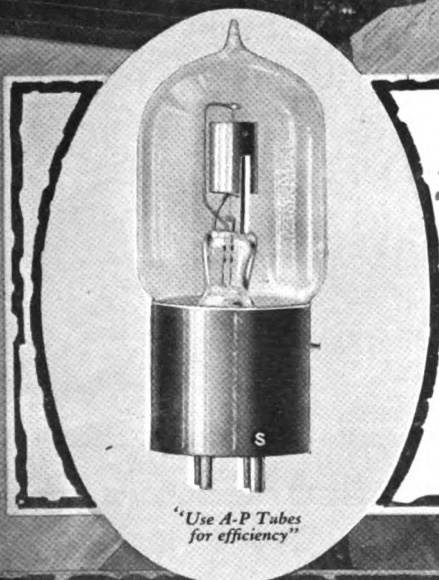
NOVEMBER, 1921

SAN FRANCISCO

20 CENTS



Miss Ruth Phipps,
San Francisco So-
prano, singing over
the De Forest Radio-
phone at the Cali-
fornia Theatre.



"Use A-P Tubes
for efficiency"

Hear her with A-P Tubes

To receive our daily concerts from the California Theatre, and enjoy them completely, use A-P. tubes and De Forest Inter-panel C. W. equipment. At your dealer or direct from us. Write for catalog.

ATLANTIC-PACIFIC RADIO SUPPLIES CO.

HENRY M. SHAW, President

638 Mission Street

San Francisco, Cal.



Cunningham
C-300
Gas Content
Detector

\$5.00

Announcing the New Home of **CUNNINGHAM VACUUM TUBES AND REMLER RADIO APPARATUS**

THE strict adherence to quality in the manufacture of Cunningham Tubes and Remler apparatus has been largely responsible for the nationally recognized merit and increased sales of our product which has necessitated the enlargement of our plant facilities. With our Chicago office functioning as a central and Eastern distributing center under the direction of Herbert H. Frost and our enlarged San Francisco home office and plant we are now in a position to render a more highly perfected service to our valued clientele.

If you have not received our new 32 page catalogue of Remler Apparatus and Cunningham Tubes send your name and address today for free copy.

E. J. Cunningham

General Manager

**REMLER RADIO MFG. COMPANY
AUDIOTRON MFG. COMPANY**

248 First Street
San Francisco, Calif.

154 West Lake Street
Chicago, Illinois

REMLER APPARATUS RADIATES QUALITY
CUNNINGHAM TUBES MEET EVERY AMATEUR REQUIREMENT

IT'S ONLY A STEP FOR YOU NOW TO A FINE WIRELESS POSITION

SURELY you have noticed how wireless is spreading over the world like wildfire! Every day you learn of some new field that is utilizing it—some new firm organized to push it forward. Big opportunities are open—and every day get more numerous and attractive. But do you realize that YOU can easily qualify for the wonderful opportunities that are opening? Amateurs—do you know that you can quickly build upon your present knowledge of Wireless—and be ready any time you wish for a fine Wireless position, either on land or on sea? You are in a fine position to cash in big on this growing field. Right at home you can easily build upon your present knowledge and quickly qualify. Through our special method of home-study instruction a short period of your spare time can be turned into preparation for a worthwhile future in the fastest-growing field in America today—Wireless. You have the whole foundation, all ready to build upon. Our new, easy method of instruction makes the rest pure fun—but fun that pays big.

The coupon below will bring you an interesting free booklet—telling about the splendid opportunities open, and how you can share them. Mail coupon for booklet today!

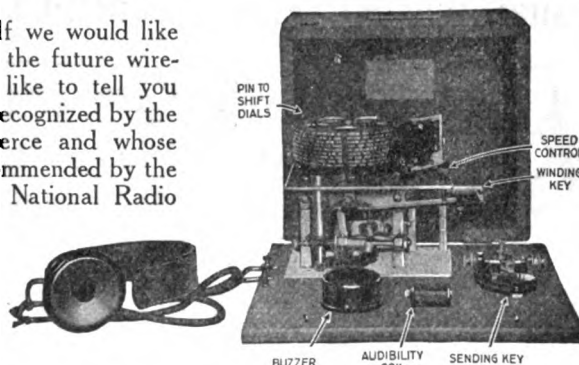


Both on sea and on land a fine future awaits the man who is qualified in wireless. No matter whether you wish to visit every nook and corner of the world or whether you prefer a land station, wireless awaits you.

New Method Makes It Easy to Qualify

WITHOUT obligation to yourself we would like to tell you more fully about the future wireless offers you. We would like to tell you about our Institute, which is officially recognized by the United States Department of Commerce and whose name heads the list of the schools recommended by the United States Shipping Board. The National Radio Institute was the original and is today the oldest and largest school in America teaching wireless by mail—having over 7000 students in all parts of the world. The government allows our graduates five to ten points credit when taking First Grade Government License examinations. We have graduates all over who have quickly qualified through our special new method.

This method not only includes a comprehensive course of instruction written exclusively for us by some of America's greatest wireless experts (members of our own staff) but also includes—as part of the course—a wonderful new in-



This is the famous Natrometer

vention patented and controlled by us. This device, called the Natrometer, is pictured here. It teaches you in half the usual time how to send and receive, with speed and accuracy. This Natrometer (which can be purchased separately) is superior to any other device of its kind. Without aerial or any outside device it sends you any one of 600 different messages at a speed which you can vary from 3 to 100 words per minute. It is portable; also very attractive in appearance. It is noiseless; and it sends in a natural manner, not like a mechanical device. You get the messages thru its 'phones at whatever speed you wish. And this is **only one** of the features which our new method brings you. Others are listed below. Read them and you will realize why our students quickly qualify and why they step into the fine wireless positions that are waiting!

11 Points That Make This School the Best

1. Wonderful Natrometer Given with Course.
2. New, Easy Method of Copyrighted Theory Instruction.
3. Our Diploma Given Government Credit and Recognition.
4. Our Location in Washington—Passing New Official Radio Developments on to You.
5. Personal, Individual, Attention of Great Experts.
6. Guarantee of Position or Tuition Refunded.
7. Free Training in Wireless Telephony.
8. Unlimited Consultation and Advisory Service.
9. Free Post-Graduate Course, if You Wish, in Our Washington or Baltimore Residence School.
10. Membership in the National Radio Relay League.
11. Low Tuition Cost and Easy Terms of Payment.



Besides being the largest school teaching Wireless by mail, The National Radio Institute has large residence schools in Washington and Baltimore.

Mail coupon today for our free illustrated booklet, "Wireless, the Opportunity of Today." Without cost or obligation, we want to tell you more about this field, its big opportunities both on land and on sea, and just how our new method quickly qualifies you. No agent will call upon you. We just want to send you the facts. Mail coupon at once!

NATIONAL RADIO INSTITUTE,
Dept. 2911, Washington, D. C.

NATIONAL RADIO INSTITUTE,
Dept. 2911, Washington, D. C.

Send me your free booklet, "Wireless, the Opportunity of Today." Tell me about the opportunities open in wireless, about your Institute, and your offer.

Name..... Age.....
(Please Write Plainly)

Address

City State.....

.... I am interested in a Sea position.

.... I am interested in a Land position.

Say Radio to the Advertiser, it will help you.

— MOVING —

The great demand for "Wireless Shop" products has been growing so fast that we couldn't begin to take care of it in our present location, so we have built a completely new plant and salesroom, plenty large enough to put in new machinery and help, and give you SERVICE.

We wish to announce that on or about October the tenth, we will move to our new building, located at 1262 West Second St., Los Angeles, and then watch our dust.

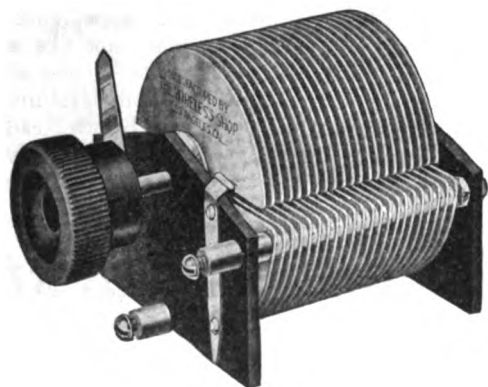
A special department will be maintained to take care of those little jobs you have always wanted in a hurry (but could never get). If you have a rush job, just try "THE WIRELESS SHOP."

A lot of new machine tools are already on the way to take care of the growing demand for "WIRELESS SHOP VARIABLE CONDENSERS," and plenty of help will be on hand to run these machines and assemble finished parts. Lack of space is all that has been holding us back in the past, so now watch the condensers fly.

Quality—as Usual, will ALWAYS Remain Paramount with



"Consider the QUALITY Before You Buy"



Our "SERIES 'T' " Variable condenser is a high grade, quality product throughout, designed for those who want the best. Fitted with knob and pointer and mounting screws, and packed in individual cartons.

PRICES

No. 20	2 plate, Vernier Condenser	.....	\$2.00
No. 70	7 plate, approximately .0001 m. f. maximum capacity	.....	2.35
No. 130	13 plate, " .0002 m. f. " "	.....	2.75
No. 170	17 plate, " .0003 m. f. " "	.....	3.15
No. 230	23 plate, " .0005 m. f. " "	.....	3.60
No. 310	31 plate, " .0007 m. f. " "	.....	4.30
No. 430	43 plate, " .001 m. f. " "	.....	5.25
No. 630	63 plate, " .0015 m. f. " "	.....	7.50

Include postage for one pound to your postal zone, and insurance.

Our Series "L" and "CW" are larger models, built for receiving and for "CW" work, and are fully described in our Bulletin No. 1, which will be mailed for the asking. Where shall we mail your copy?

Our new, complete catalogue will be ready for mailing shortly, and if you want us to reserve you a copy, get your name on our mailing list at once.

Here's to Better Instruments, Better Service and Better Radio

THE WIRELESS SHOP

1262 West Second Street,
Los Angeles, Cal.

Say Radio to the Advertiser, it will help you.

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Lawrence Mott
Associate Editor

H. W. Dickow
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Vol. III, No. 4

NOVEMBER, 1921

Per Copy 20 Cents

Radiatorial Comment

RUMOR hath it that the congressional re-organization committee has recommended that the control of radio communication be transferred from the Department of Commerce to the Post Office Department. To make such a change just as the officials now in charge really have solved the perplexing problems arising from conflicting interests of governmental, commercial, and amateur operators, would seem to be the height of folly. While we are heartily in favor of the spirit actuating the re-organization committee in its efforts to put more efficiency into Federal bureaus, we suggest to the members of the committee that to first sound out the sentiment of the radio fraternity before recommending any drastic changes in existing arrangements would be more likely to insure the eventual adoption of whatever recommendation they may make. Meanwhile, on the theory that a watt of prevention is worth a kilowatt of cure, protests are in order. To head off the matter in committee hearing will be easier than on the floor of Congress.

THOUSANDS of operators throughout the country will learn with regret that E. T. Chamberlain, the greatly beloved and respected Commissioner of Navigation of the Department of Commerce at Washington, is leaving this work to become head of the Bureau of Foreign and Domestic Commerce. This regret, however, is mingled with pleasure at the announcement that D. B. Carson will become the new Commissioner of Navigation. From his past record we have every reason to believe that Commissioner Carson will exercise the same sympathetic understanding of the needs of the amateur as did his predecessor. In leaving this branch of the service Mr. Chamberlain carries with him the best wishes of the entire radio industry.

GRAT publicty has been given the radio telephone in the West during the past month on account of the wonderful concert given by the stars of the Scotti Grand Opera Company, the radio sermon of Dr. Van Winkle of the First Christian Church of Oakland, and the radio music furnished by Steindorff's 60-piece band. This service, as furnished through the enterprise of the radio men, is helping to popularize radio more than would any other agency. Many men of mature years are buying receiving sets and soon can be counted upon as influential radio fans. To improve the music, to prevent duplication of effort and to avoid interference why could not the newly formed Pacific Radio Trade Association establish

central transmitting stations at strategic points and undertake co-operatively and thereby more effectively what is now left to individual firms?

SINCE the days of Robin Hood, down through the age of pirates and smugglers, and now in this time of bootleggers and Roy Gardners, the romance of excitement and adventure ever has been attached to playing the game of lawlessness. While our interest and our sympathy naturally goes out to those in trouble, law-breakers too often have been the heroes of literature. Small wonder it is then that there is insidiously created a desire to emulate these ancient deeds of valor, and to break those laws by which we are restrained.

You cannot blame the boy who thinks it big to break the law when he has been fed up on these stories and taught to admire the law breakers. On every hand, also, he hears his elders boast of their prowess in evading the speed cop and the prohibition sleuth. In the shelter of the home he himself has been judged by a lenient standard and held to a small degree of responsibility.

So when he gets his license he does not realize the seriousness of the rules that limit his wave length and his sending power. When he finds the 200-meter field too crowded he goes up a few notches, and when his feeble spark or tube is QRM'd by some big commercial station he throws in another ampere of radiation. But by so doing he plays havoc with legitimate business and government messages. The radio inspector steps in and shuts down his station and he learns, for the first time, that laws are not made merely to be broken.

However unpopular or unequitable a law may be, still it is a law, a rule of conduct for the protection of society, a means for providing the greatest good for the greatest number. If it is wrong, it will soon be repealed. But while it remains a law it should be obeyed.

Personally, RADIO believes that this limitation of wave length is hampering ambitious young men and is throttling legitimate development of radio communication. We believe that the amateur should be allowed to work up to 350 meters and that other stations should be raised accordingly, and we are doing our part to bring this about. But meanwhile we must obey orders.

You, as a radio amateur, can do your part by showing through your obedience of the present law your fitness to receive the privileges of a less restrictive law.

Now in Our New Home

Coincident with the change of name from Pacific Radio News to "Radio" we announce the establishment of editorial and business offices at 465 Pacific Bldg. San Francisco, where we will be glad to welcome our friends

The New Federal Arc Station at Palo Alto

By H. R. Pratt

THE Federal Telegraph Company, a California corporation and organized in San Francisco, has for years been known to all interested in the radio field as the first to employ modern radio equipment, using undamped waves for commercial long distance telegraph communications. For a number of years prior to the war this company, through progressive steps, developed in its research and engineering departments, the first practical continuous wave radio transmitter known to the engineering world, and built and placed in operation a chain of radio stations using the equipment which had been developed, embracing the western coast of the United States and the Hawaiian Islands.

The United States Navy Department, observing this important development, took occasion to investigate the system, which it found so well adapted for military communications that a contract was arranged for the Federal Company to install a complete set of its transmitting equipment in the Arlington (Va.) Radio Station, which at that time had just been completed and was the most powerful radio station in existence. The arc transmitter which was supplied on this contract gave such superior performance that additional contracts were immediately consummated by the Navy Department for a number of high power radio stations. During and following the period of the world war, the Federal Company equipped additional high power radio stations for the Navy Department, which have resulted in a chain of stations extending throughout all American possessions. All of this equipment was designed in California by Federal engineers and manufactured at the company's factory at Palo Alto.

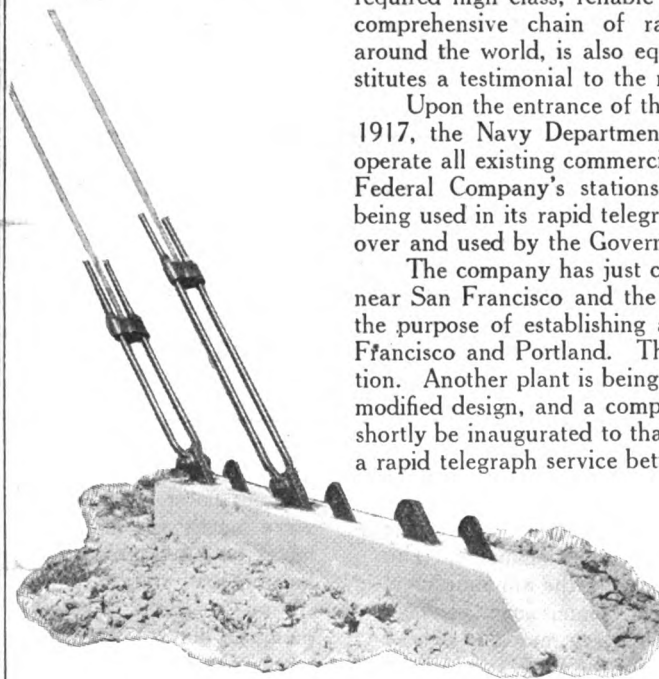
The experience of the Federal Telegraph Company through its years of activities has resulted in the development of arc radio transmitters to a very high degree of efficiency. The fact that the United States Navy Department adopted this system at a time when it

required high class, reliable radio equipment, and that the most comprehensive chain of radio stations ever built, stretching around the world, is also equipped with Federal apparatus, constitutes a testimonial to the meritorious features of the system.

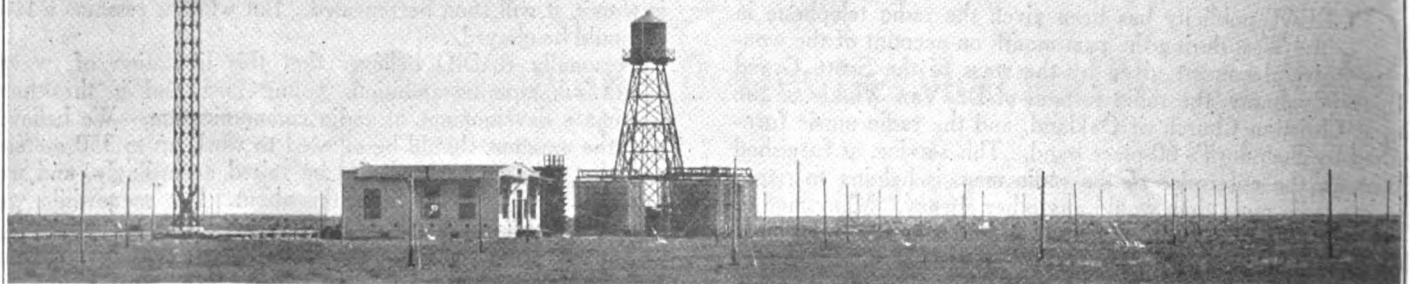
Upon the entrance of the United States into the world war in 1917, the Navy Department was authorized to take over and operate all existing commercial radio stations in the country. The Federal Company's stations on the Pacific Coast, which were being used in its rapid telegraph service, were, accordingly, taken over and used by the Government for military purposes.

The company has just completed two new radio stations, one near San Francisco and the other near Portland, to be used for the purpose of establishing a reliable radio service between San Francisco and Portland. These stations are now in active operation. Another plant is being erected at Los Angeles, of somewhat modified design, and a complete commercial service by radio will shortly be inaugurated to that city, making available to the public a rapid telegraph service between Seattle, Tacoma, Portland, San Francisco, Los Angeles and San Diego.

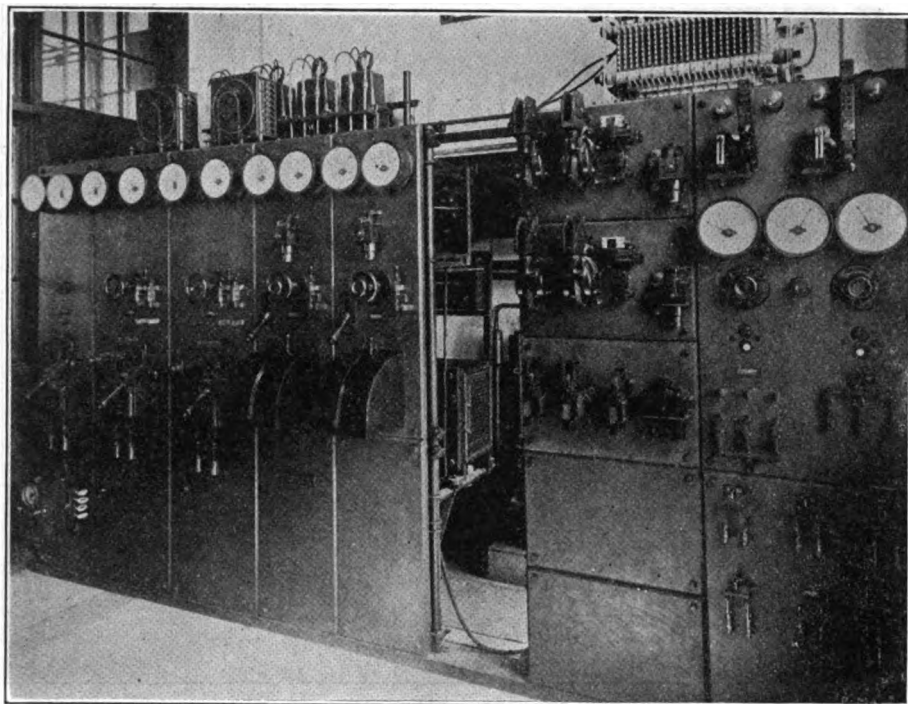
The Palo Alto Station, near San Francisco, has a 626 ft. guyed steel mast of modern design, supporting a large section-



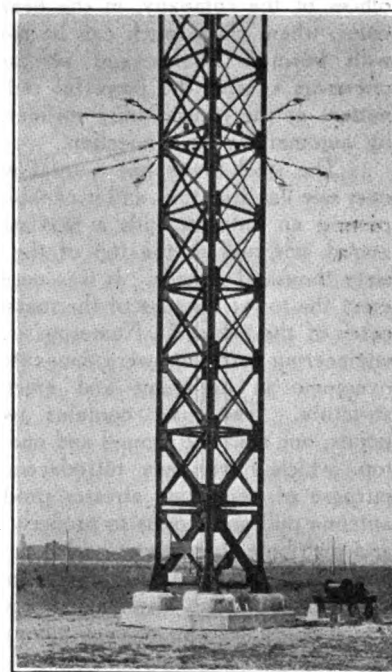
One of the Guy Anchorages.



The New Palo Alto Station of the Federal Telegraph Co., Showing 625 ft. Mast, Power House, Cooling Tower, Outdoor Condensers and Counterpoise Ground System.

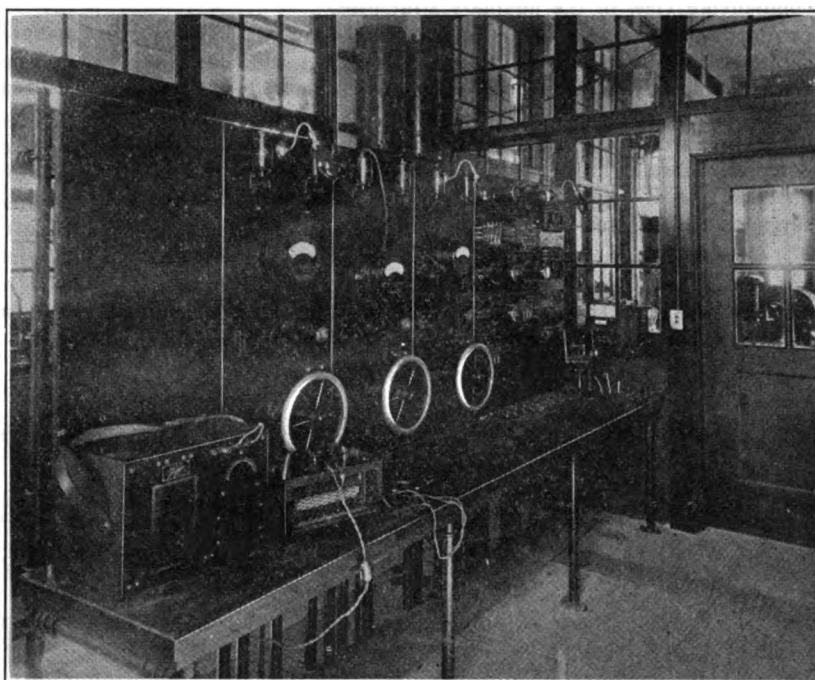


Main Power Switchboard.

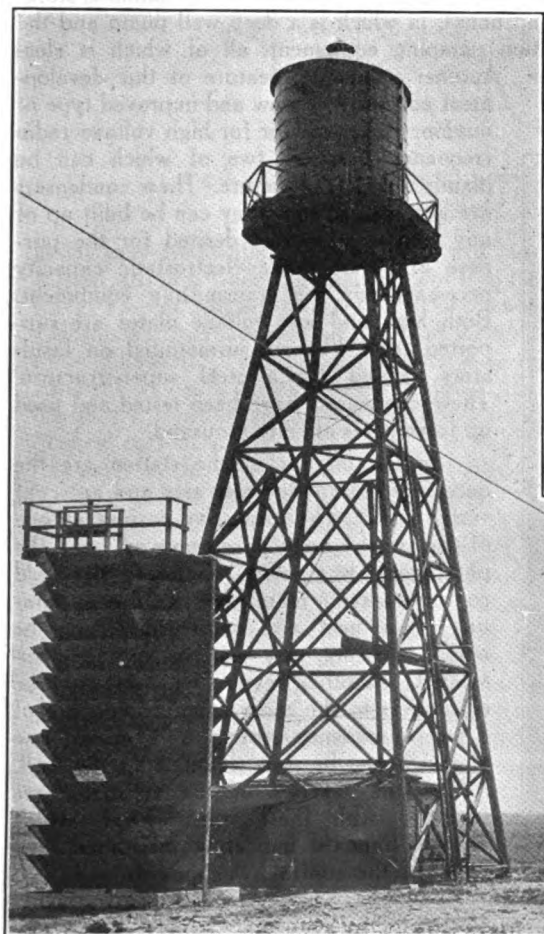


Base of 626 ft. Steel Mast, Showing Counterpoise Ground System.

alized umbrella antenna system. This covers an area of over 150 acres. Many new recent developments in the radio art have been taken advantage of in the building of these stations. Among these is the use of high speed and automatic equipment with multiplex communication channels. All receiving and transmitting operators are in the main



Station Control Switchboard and Table.



Auxiliary Structures Surrounding Power House, Including Outdoor High Voltage Condensers and Water System.

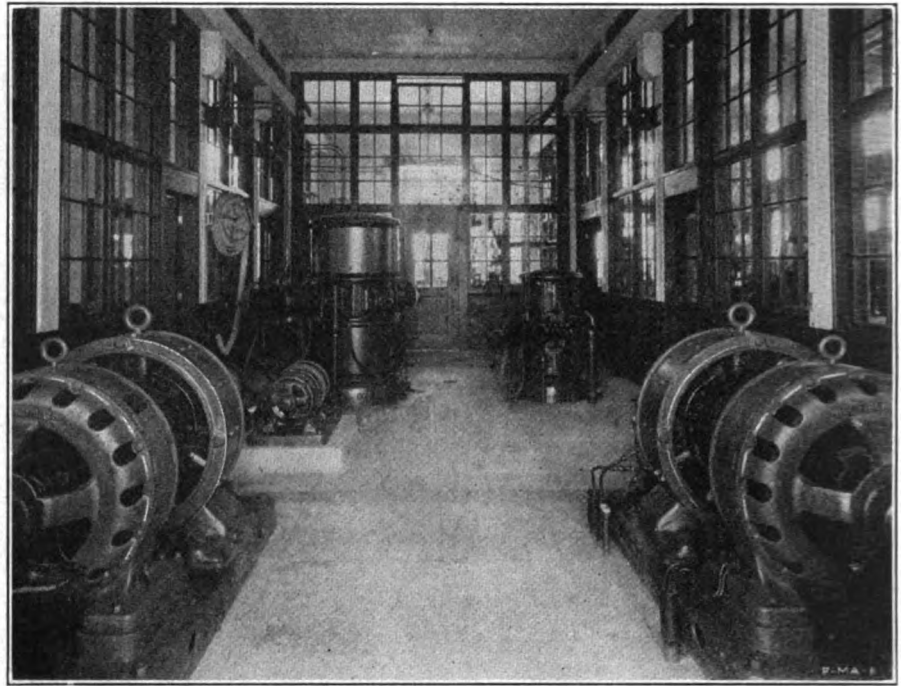
offices of the company, in the heart of the cities, where close touch can be maintained with business houses and offices. These operators control the powerful radio transmitters at the transmitting stations directly by automatic wire connection.

The steel tower has a total weight of over one hundred tons and is capable of supporting an antenna with a maximum horizontal side pull at the top of the mast of sixty thousand pounds. It was necessary to erect the tower because of the marshy character of the sub-soil. Numerous interesting engineering problems were encountered and overcome in designing and erecting this structure. The mast contains two pivot points, one near the ground and one near the top, which have been introduced for the purpose of permitting stresses produced by antenna pull and storms to properly equalize and distribute themselves, and it is this feature which enables this structure to support an antenna of such massive construction.

The greater part of each guy anchorage is under the surface of the ground. All of these are also supported on pile foundations in the case of the Palo Alto Station.

Prominent in the foreground of the accompanying view of the auxiliary structures surrounding the power house is one of the antenna lead-in cables and one of the high potential insulators used for this construction is visible where the connection is made to the side of the power house. There are several of these conductors distributed around the building, all of which are carried to the equipment inside through special antenna entrance windows, on each side of which are mounted large pillar insulators for supporting the cables.

Attached to the side of the power house can be seen the gas seal exhaust pipes from the various arc converter units installed within. These gas seals are provided with special valves so that the arc chambers may be readily cleaned auto-



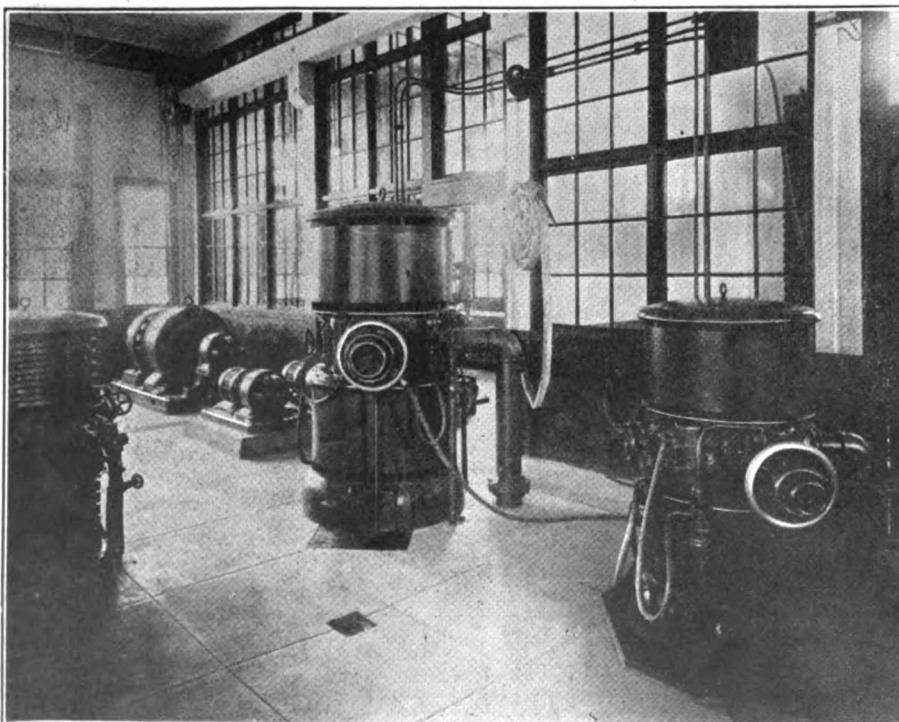
Main Power Machinery and Arc Room.

matically through a blower system. The blower used is mounted in a small, ventilated housing, which can be seen in the center of the picture.

In designing these stations it was decided to utilize a water circulating system for cooling the arcs and for the purpose of economizing in water, cooling towers of proper capacity to secure the desired heat dissipation were provided. One of these can be seen alongside of the water tank and tower in the picture. At the base of the tank tower is a combined store-room and pump house, in which is a deep well pump and the necessary station pumping equipment, all of which is electrically driven. Another interesting feature of this development consists of a new and improved type of outdoor air condenser for high voltage radio frequency currents, two of which can be plainly seen in the picture. These condensers are arranged so that they can be built up of any number of plates desired for the purpose of securing the electrostatic capacity necessary for the transmitting equipment. Both high and low voltage plates are supported from I-beams surmounted on insulators carried by a steel super-structure. These condensers have been tested and used up to voltages of sixty thousand.

In the interior of the station are the necessary motor-generator sets and arc converter units. The protective casings of one of the smaller units were removed when the photograph was taken, disclosing the field coil construction employed with this apparatus. This field coil construction can be noted as being very massive and well insulated. Another feature which should be of interest to the radio engineer consists of a radio frequency current transformer, one of which can be seen mounted on the wall. All of the stations of the company are equipped with these transformers, which operate standard indicating instruments located on the control switchboards.

(Continued on Page 136)



Main Power Machinery and Arc Room.

The How and Why of Radio Tuning

By B. F. McNamee

ONE of the most wonderful things about radio to the mind of the layman is the fact that many different pairs of stations can transmit and receive messages in the same locality and at the same time without interfering with each other—of course, providing that they are using different wavelengths. To understand the method by which this is accomplished is to understand the principle of tuning. And the object of this article is to explain in simple words the tuning idea, as well as some of the instruments used for this purpose.

First let us see how a transmitting station sends out a message on any particular wavelength. The aerial at the transmitting station consists of a number of wires suspended from insulated supports and having a wire connecting it with the sending apparatus. This sending apparatus consists of an arrangement for charging and discharging the aerial with electricity almost any number of times per second, as desired. Each time that this charging takes place, energy is radiated from the aerial in the form of an electro-magnetic wave.

If the charging and discharging of the aerial take place very rapidly, or, in other words, if waves are sent out from the

1,500,000 wave per second corresponds to a wavelength of 200 meters; a frequency of 300,000 waves per second corresponds to a wavelength of 1000 meters.

In order to see how waves of various lengths will affect a receiving set it will be necessary to consider **free oscillations**. We know that a clock pendulum will swing back and forth in a certain length of time if allowed to swing **freely**, and that this length of time will always be found the same, provided that the length of the pendulum and the force of gravity are kept the same. We all know that to shorten a pendulum is to cause it to oscillate faster, and that to lengthen it is to cause it to oscillate more slowly. In fact, any object which tends to vibrate or oscillate when moved from a position of rest will always taken a constant length of time for each swing.

Now we are ready for the important case where we have two pendulums or other vibrating bodies having the **same number of free oscillations per minute**, or, in other words, **tuned to each other**. Let us take the oft-repeated experiment shown in Fig. 2. A and B are two pendulums consisting of weights attached to strings of equal lengths. C is another similar pendulum, but either longer or shorter than the first two. All

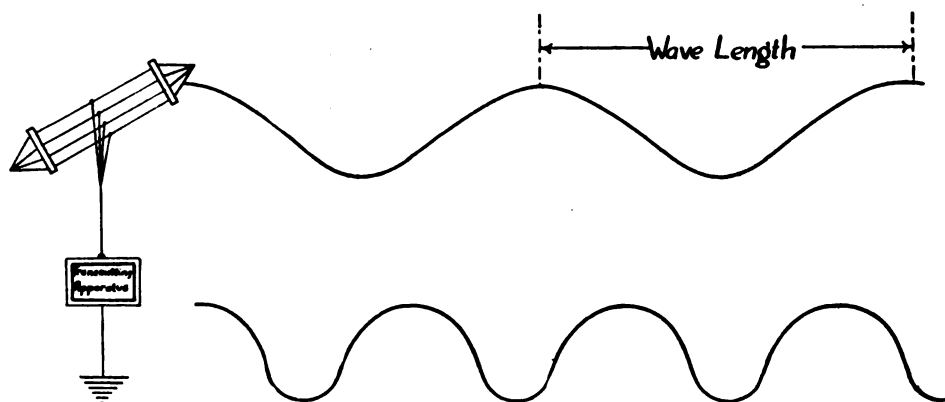


Fig. 1. Variation of Radiated Wire Length with Frequency of Vibration.

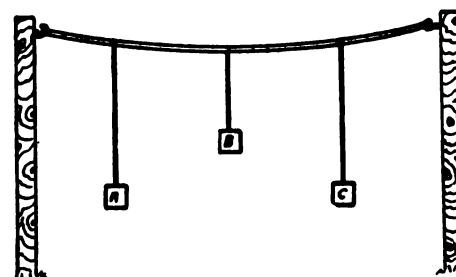


Fig. 2. Pendulum Demonstration of Tuning.

aerial very frequently, the first wave will have traveled only a short distance when the second wave is sent out. But if the waves are not sent out so frequently, one wave will have gone a distance of perhaps several thousand meters before a second wave follows it. Now the distance between the crests of two adjacent waves is called the wavelength. This is simply saying that a short wavelength is the result of a very high frequency current in the aerial, and that a currency of lower frequency in the aerial would cause a longer wavelength.

The speed at which these electric waves travel is the same as the speed of light—186,000 miles per second. Expressed in the metric system, this speed is 300,000,000 meters per second. Suppose a transmitting station should send out just one wave every second. The first wave would have traveled 300,000,000 meters before the second wave started. As these waves travel on, they will, of course, remain the same distance apart. So in this case the wavelength would be 300,000,000 meters. If the transmitting station should send out ten waves per second, each wave would have traveled only one-tenth of a second before the next wave was sent out. In one-tenth of a second a wave would travel one-tenth of 300,000,000 meters, or 30,000,000 meters, which would be the wavelength.

We see, therefore, that to find the wavelength corresponding to any particular frequency, it is simply necessary to divide 300,000,000 by the frequency. For example, a frequency of

three pendulums are suspended from a string stretched between two supports. Pendulum A is brought to one side and allowed to swing **freely**. There will be little or no effect on pendulum C, but pendulum B will commence swinging, very slightly at first, but gradually increasing in strength. This is a simple demonstration of tuning. Pendulum A transmitted a series of feeble impulses along the string supporting the pendulums. None of these feeble impulses was in itself sufficient to start the other pendulums swinging to any noticeable extent, and for this reason pendulum C does not swing. But in the case of pendulum B these feeble impulses were supplied at exactly the right time, so that each impulse added its effect to that of the preceding ones.

The same effect may be studied in a great many ways without setting up any special apparatus. Stand beside a rocking-chair and give it a series of slight pushes with the finger, in such a direction as to start it rocking. If the pushes are carefully timed to correspond with the free oscillations of the chair, it will, in a short time, rock as far as desired, but such a series of slight pushes will accomplish little if not so timed.

The simplest receiving set generally has a tuned circuit consisting of an aerial, a coil and an earth connection. If we give the aerial an electric charge it will discharge through the coil to ground, but the action will not stop at complete discharge any more than a pendulum will come to rest at the end of the

first half swing. There will be a current flowing back and forth through the coil, gradually decreasing in strength until it dies out completely. This is a **freely oscillating current**, and the number of oscillations per second will depend on the size of the aerial and of the coil.

Suppose that we wish to hear a station that is sending on a wavelength of 1000 meters. This means that waves from this station are striking the receiving aerial at the rate of 300,000 waves per second. Now if the coil and aerial are of such a size that the number of **free oscillations** per second in this circuit will be 300,000, this receiving circuit is tuned to the transmitting station in question. There is a feeble current started oscillating between the receiving aerial and earth by the first wave, and each succeeding wave adds to this current, because, as in the case of pendulums A and B, mentioned above, each impulse is correctly timed.

Now suppose that we wish to listen to a station that is sending on a wavelength of 200 meters. This means that waves are reaching the receiving aerial at the rate of 1,500,000 waves per second. In order to tune our receiving circuit so that it will freely oscillate at the rate of 1,500,000 times per second, it will be necessary to use a smaller coil, or to use only part of the turns. This corresponds in the pendulum experiment to saying that if pendulum A were shortened so as to swing a greater number of times per minute, it would be necessary to shorten pendulum B to keep the two in tune.

Besides **free oscillations** we have to deal sometimes with **forced oscillations**. If, in the rocking-chair experiment given above, the chair would freely rock back and forth ten times per minute, we could easily force it to rock back and forth three times per minute or twenty times per minute or almost any number of times per minute by taking hold of it and applying force. This corresponds in radio to having a receiving outfit in the immediate vicinity of a powerful transmitting station. The waves from the transmitting station in this case strike the receiving aerial with such strength that they may force an oscillating current of sufficient strength to cause interference even when the receiving circuit is tuned to some very different wavelength. This interference can be to some extent overcome by using very loose inductive coupling, to be described in a later article.

When a slight adjustment of the receiving tuner is sufficient to bring in or shut out a particular signal, the tuning is said to be **sharp**. On the other hand, if the signal remains strong over quite a range of adjustments on the receiving tuner, the tuning is said to be **broad**. In the case of some transmitting stations, especially spark stations, this broad tuning is caused by the radiation of the energy on a whole series or band of wavelengths instead of on one single wavelength. For example, a station that is supposed to be sending on a wavelength of 200 meters may be sending out more energy on 200 meters than on any other wavelength, but it may be transmitting some energy on many other wavelengths ranging from, say, 180 meters to 220 meters, and, of course, can be tuned in on these wavelengths.

Broad tuning is not always the fault of the transmitting station. It may result from forced oscillations, as mentioned above, or it may be the result of a poorly designed aerial and receiving tuner.

THE NEW FEDERAL ARC STATION AT PALO ALTO

(Continued from Page 134)

At the control switchboard and operating table of the station, located in a separate room, are the terminals of the incoming control lines, telegraph instruments and keys, high speed signaling relays, and the arc control switchboard panels themselves. One operator can run all of the transmitters at this station from this one position, where all controls are concentrated.

The main power switchboard of the station has panels

for each motor and generator in the plant. The main motors are 2,200 volt and of the synchronous type. Power is brought into the station through a three-phase underground cable, which terminates behind the switchboard.

The construction of these stations and the resumption at this time of radio commercial telegraph service on the Pacific Coast by the Federal Telegraph Company have been made possible through the recent organization of its affairs by its president, Mr. R. P. Schwerin.

HOW TO HEAR THE RADIO MUSIC IN THE AIR

There is radio music in the air, every night, everywhere. Anybody can hear it at home on a receiving set, which any boy can put up in an hour. One of these sets costs less than a phonograph. With it can be heard grand opera, orchestras, phonograph music, market reports, press summary, sermons and speeches. All that is needed is a hundred-foot clear span of copper wire, a couple of batteries and a cabinet set that can be bought from a radio dealer in every town.

First string an aerial between two chimneys, houses or poles about a hundred feet apart and twenty feet or more high. Use a porcelain insulator at either end, where attached, drop the wire down and bring it into a room through a window or a hole in the wall, and hitch it on to one of the set's terminals. All that is needed for an aerial are two insulators and a hundred feet of hard-drawn No. 14 copper wire. Attach a piece of the same kind of wire to the other set terminal and hook tightly on to a buried water pipe for a ground.

A six volt storage battery—an old automobile battery will do—is needed to furnish current to light the filaments in the vacuum tubes, which are the important parts of the receiving set. A 45 volt dry battery furnishes the current for the vacuum tube plates.

The elaborateness of the set depends upon the price paid, varying from \$25 to \$300, but every set contains three inductance coils, or variometers, and two condensers, which must be adjusted so that the receiving set is in tune with the sending set, as described in detail by Mr. B. F. McNamee in the preceding article.

A vacuum tube is used to detect the high frequency electric vibrations sent out from the transmitting set and received on the aerial. This tube acts like a one-way valve or rectifier and feeds the current to the telephone receiver just as in the ordinary wire telephone. This will bring in the sound loud enough to be heard by a telephone head-set and by itself constitutes a cheap receiving outfit.

But in order to be heard by every one in the room it is better to get a telephone receiver equipped with a horn and add two more vacuum tubes and transformers which amplify or make the signals louder. Still louder results can be attained with the further addition of any one of several loud-speaking telephones.

Most of the battery sets come in a cabinet in which are mounted the inductance coils, condensers, vacuum tubes, transformers and battery connections. The front of the set contains various dials which control the tuning and the amount of current from the batteries. The use of these dials will be explained in future articles or may be learned from any radio man in half an hour.

Such a set also detects wireless telegraph messages which anyone with a knowledge of the Continental code can read. No license of any kind is necessary to operate it and the music and news are free for all.

No better investment can be made as a means for making a home more attractive to the entire family. Radio brings fathers and sons together on a common basis of mutual interest. The women can easily tune in during the afternoon and have a constant source of entertainment for their guests. Any phonograph selection will be played on request to the operator in charge of the sending station. No home is complete without radio.

Cutthroat Competition in General Public Business

A Samuel Jones Story—By Volney G. Mathison

IT all had its beginnin' one cold afternoon when I was sittin' in my shack enjoyin' the ruddy warmth of the big coal-heater close abeam as I looked out of my big bay window an' watched the gusty flurries of hard, dry snow that swirled among the opposite cliffs an' foretold the approach of Alaskan winter.

Sick an' tired of readin' magazines an' doin' nothin', I was chewin' the rag with K-O-X-N on the little half-inch spark-coil that I use for short-distance monkeying around.

"Say, I'm gonna tell you somethin', Hell-Fire," I says on my key to my hard-boiled colleague over at Pirate Cove; "I've been thinkin' it over, an' I've come to the conclusion that the company I'm workin' for ain't got no sense—"

"Tell me somethin' new, S. J.," breaks in Hell-Fire, on his similar spark-coil; "I found out when I built these two stations that neither one of these codfishin' outfits got any brains worth braggin' about.

"There you are on Unga Island an' here I am on Popoff Island, less'n twelve miles apart, an' each with a wireless station powerful enough to reach the three hundred an' some miles to N-P-Q an' N-P-R. There's sure no sense in these two big stations bein' here together. If these fishin' concerns wasn't so much like a coupl' a scrappin' tomcats, they'd 've agreed to both use this big set here at Pirate Cove, an' only have a little spark-coil outfit over there at Unga—"

"Or both use th' big set here at Unga an' put th' spark-coil rig over at your joint—this station was here first, anyway," I comes back.

"Q-R-T! Q-R-T! Q-R-T! K-O-X-N and K-V-I, Q-R-T!" squeals a loud, mushy 500 cycle quenched spark, which I recognizes as belongin' to an old salmon-steamer lyin' over at the Squaw Harbor fish-cannery, about five miles away: "Say, lissen, can't you darned ginks struggle through a single day without startin' that same confounded never-endin' argument—it's gettin' staler'n five-year-old codfish! I'm tryin' to copy a little press from N-P-R—Bk will you!"

"Hey, you stinkin' ol' fish-barge, whadda'ya mean bawlin' ME out like that—don't ya know who I am?" howls Hell-Fire from his side of the creek. "If ya want press, copy it on arc like I do—or go without! If ya ever open up on me again at five miles with that blasted old busted-steam-whistle spark 'a yours, I'll come over there to th' fish-morgue an' ram your stutterin' ether-wreckin' key down your throat—an' I hope you got what I said, because if you haven't I'll

start up the diesel-engine on my big set an' throw enough kilowatts at you to knock your rusty ear-drums inside out! Hear me!"

A dead silence on the air follows this; so I figures the mutt on the fish-scow must'a heard.

"As I was sayin' a while ago, I think this codfish crowd is nuts," I resumes on the key as I look out of my window thoughtful-like at the heavy ocean swell boilin' among the rocks forty feet below: "Here they've got all kinds of good dough tied up in an engine an' generators an' a lott'a apparatus, as well as



The Great Northern Fisheries of San Francisco were in receipt of the following telegram:

"Send twelve audion bulbs; terrific explosion occurred last night. In addition, ship complete set of meters for power house, one armature, new left-side engine flywheel and sixty feet belting. Nosey Olsen hanging around when explosion occurred. Notify Swedish-American Life Insurance Co."

th' shack and an aerial over a hundred an' thirty feet high an' four-hundred long—an' what do they get out of it? About half-an-hour's run every day, sometimes less, handlin' th' company's private fish business an' a few stragglin' messages from th' insane an' moonshine-struck inhabitants of this here island. Outside of company business, during the last 10 days I ain't had but two messages—one goin' out from Soap Komedal's Pool Hall an' one comin' in fer Loo Hung's Hash House. Two messages in ten days! Think of it!"

"Ya ain't got nothin' on me," responds Hell-Fire, sendin' sorrowful-like, "I ain't had a blamed thing go out fer three weeks, an' only one collect night-letter come in, which was fer th' Corned-Beef

Kanaka, th' cook, an' he's broke—so I had to cancel it."

"Th' trouble with this station is that it's licensed wrong," I declares; "it's got a limited commercial license, which allows me to work on with N-P-R an' no other stations except N-P-Q, if N-P-R happens to be broke down. What I should have is a general public license to work with any an' all stations, ship or land. Besides, all th' Alaska wagons that go by, there's dozens an' dozens of shippin'-board steamers an' oil tankers makin' th' Great Circle from the States to the Orient; an' every night I sit an' listen to 'em gettin' th' brass-pounder's cramps from callin' the navy stations, with business to send. Th' gobs are too busy sendin' government deadheads an' makin' home-brew to bother with th' ships, an' if I had a P-G license I could gather up all that ship-business every night an' relay it to N-P-R on eighteen-hundred meters on my regular daily schedule.

"This station would get the six cents a word coast tariff; an' s'posin' I got only twenty-five messages a night averagin' about fifteen words, that'd be somethin' over twenty-five dollars' profit fer th' company—an' I'd have somethin' else to do besides sittin' around here burnin' up all th' coal in sight an' readin' 'Stormy Stories.'"

"Say, I'm sure glad you told me all that!" buzzes Hell-Fire, "I never thought of it before. I'm goin' to rush a letter out on that salmon-packer tonight to th' home-office explainin' th' whole lay-out to 'em an' tellin' 'em to get me a P-G license right away. I'm much obliged to ya fer th' idea."

"Much obliged, my eye!" I hammers back. "I was talkin' about MY station—not yours! We're only ten miles apart, an' that's too darned close to both be P-G stations. We'd be jammin' each other worse'n a coupl' a chatterin' old hens at a ladies' sewin' club—an', anyway, you've got plenty to do runnin' that jackass moonshine still 'a yours, without foolin' with ship's business!"

That night I gets my letter off to the home office.

What happened afterward I've got all nicely written down here in full detail, but th' ornery plug that calls himself th' author of this stuff says it's too profane to print; so here's where I go off watch an' leave him to finish it to suit himself.

(Notice to readers: After a lot of correspondence between myself and the Secretary of the Navy, I have obtained permission to publish the following messages from the files of N-P-R, the naval

radio station at Dutch Harbor that handles the outgoing and incoming business for K-V-I and K-O-X-N. Peace now prevails along the Alaskan peninsula, but fearing that the reading of this account of what happened up there last fall may stir up afresh the animosities of some of the hair-trigger citizens of Unga and Pirate Cove, the Secretary of the Navy has requested that no copies of the magazine in which these messages are printed shall be sent to the Shumagin Islands. Readers that fail to observe this request do so on their own responsibility.—V. G. M.)

Day Letter, San Francisco, Calif.

Radio, K-V-I, Unga, Alaska, via N-P-R:

Referring to your letter about radio station, we have obtained a general public license for K-V-I. Begin at once. Alaska Codfish Company.

Rush Telegram, San Francisco, Calif.

Radio, K-O-X-N, Pirate Cove, Alaska:

Great idea about ship business. We already got general public license for K-O-X-N. Grab everything in sight. Great Northern Fisheries.

Night Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Send best 600 meter regenerative receiver you can buy, also four-step amplifier. No business yet, but hear a ship coming from Japan and will probably get big string tomorrow night. Rush a good make hot-wire ammeter reading to seventy-five amperes. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Pirate Cove also got P-G license and jamming me with ten kilowatts every time I try to work anybody. Send one Hellkum Special Automatic Break-in-Key, forty gallons dynamo oil, six dozen spark plugs. No business yet, but will get a string tomorrow night. Rush ten thousand message blanks. Radio K-V-I.

Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Send by first boat an assistant operator. We must stand twenty-four hour watch to keep up with competitor at Unga. Getting only two hours sleep daily. Eleven Tr's last night, no paid business yet, but plenty soon coming. Ship two complete transformer secondaries, also new cylinderhead for diesel engine. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Enemy station hogged string last night from the ship I was waiting for last three days, but only Tr's, no paid stuff. Send another operator first possible boat; haven't slept since got P-G license. Ship twelve condenser sections, one gross of hundred ampere fuses, new hot-wire ammeter. Also engine crankshaft. Mail a

copy of the United States Radio Laws and Regulations direct to the Pirate Cove outfit. Radio K-V-I.

Day Letter, San Francisco, Calif.

Radio, Unga, Alaska:

Can't get any operator; they have all been reading about Unga in some wireless magazine and absolutely refuse to ship. Do best you can and don't let Pirate Cove crowd get ahead of us under any circumstances. Alaskan Codfish Company.

Day Letter, San Francisco, Calif.

Radio, Pirate Cove, Alaska:

Offered three hundred dollars per month for operator, but all positively refused to ship; said have been reading about you somewhere and think you are crazy. We hired a crimp to shanghai an operator, put him aboard schooner "Beulah" sailing yesterday, but when he learned ship's destination, jumped overboard. Keep up your great work; don't let Unga outfit get away with anything, no matter what you have to do. We are depending upon you. Regards. Great Northern Fisheries.

Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Hurrah; made great scoop last night, established communication over distance of 1500 miles with R-N-R, Russian Bolshevik wireless station in Gulf of Anadyr, Siberia. He will give us 300 words of paid code correspondence every night for Russian government's American bureau at Washington, D. C. Ship ten sets of sixty ampere key contacts, also 15,000 gallons gasoline. Radio K-V-I.

Rush Telegram, Pirate Cove, Alaska.

Great Alaskan Fisheries, San Francisco:

Ship one hundred pounds dynamite. Radio K-O-X-N.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Have good reason to believe that Pirate Cove lunatic is planning to blow up K-V-I. Tin-Pan Smith and the Head Cracker have been hired at ten dollars a day each to guard station and wireless masts. Getting 250 to 350 words of business from R-N-R regularly every night. No other traffic. If can buy reasonable, send a machine gun. Radio K-V-I.

Telegram, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Better charter an oil tanker quick; have been compelled to tie up all fishing boats account fuel supply exhausted. Radio station has burnt up all crude oil, gasoline, distillate and coal oil on the island; now burning moonshine costing forty dollars a gallon. Rudolph Krugscaller, Supt.

Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Ship a machine gun at any price. Fishermen of both companies have taken

up issue and are fighting daily out on fishing grounds. Enemy crowd's big schooner "Pirate King" attacked our dory fleet yesterday; sank four dories. Dago Mike, while under capsize boat, got fish hook in his nose and has gone crazy. Shotgun Sykes took command of our "Alasco Tiger" and went after enemy schooner, drove him on rocks in Man-Eater's Cove; now chasing crew all over the mountains on mainland. Ship 100 feet number 0000 copper wire for better ground connection; also twelve 300,000 volt aerial insulators. Radio K-V-I.

Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Terrific explosion occurred last night, caused by over-strength engine fuel. Send twelve audion bulbs, filaments of all but one broken by shock. In addition, ship complete set of meters for power-house panel-board, one main alternator armature, one exciting-generator armature, sixty feet belting, engine cooling water tank, new left-side engine flywheel, also enough lumber to close hole torn in side of power-house. Nosey Olsen was hanging around power-house at time explosion occurred. Notify Swedish-American Life Insurance Company. Radio K-O-X-N.

Another Day Letter, Pirate Cove, Alaska.

Great Northern Fisheries, San Francisco:

Forty-five Tr's, eight weather reports last night, one paid message eight words; our profit, forty-eight cents. Ship complete new receiving set, amplifiers, pair of phones, one gallon liniment for electrical burns and an aerial switch having at least twenty-four inches separation between switchjaws on sending and receiving sides. The Corned-Beef Kanaka was sniped by one of Unga outfit spying around here in a dory last night; recognized dory as Gumboot Hansen's, and we'll get him. Buy all 30-30 Winchester and 45 Colt ammunition in San Francisco. Radio K-O-X-N.

Day Letter, Unga, Alaska.

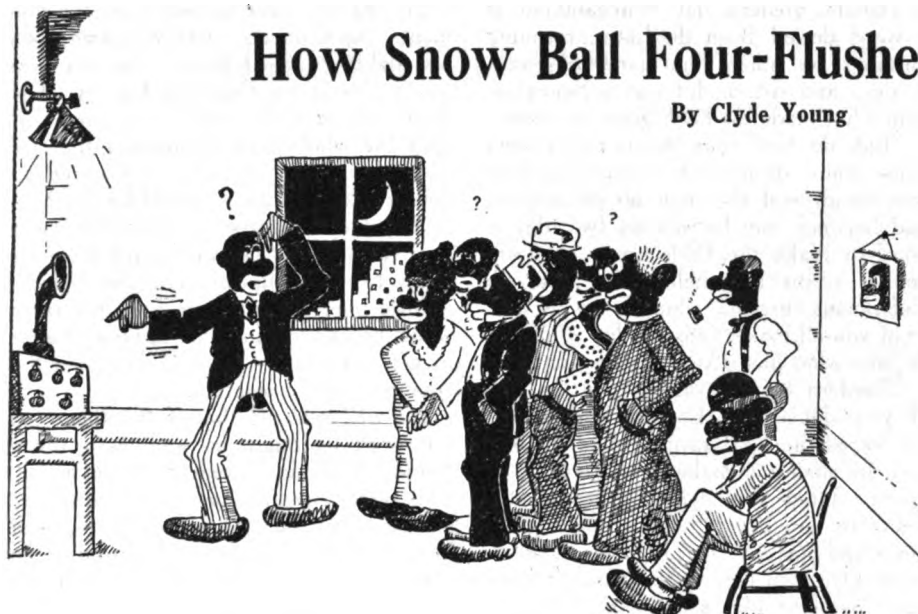
Alaskan Codfish Company, San Francisco:

All fishing has stopped. We are digging trenches around wireless station; expect attack from Pirate Cove outfit any minute. They put nitroglycerin in gasoline tank of Gumboot Hansen's dory last night; Gumboot and the boat went up in smoke this morning; tore fish wharf to pieces; haven't seen anything of Gumboot since, but dory rudder and piece of engine came down through roof of Soapy Komedal's Pool Hall this afternoon. Ship new pool table for Komedal, also four plain, standard-size tombstones. See if can buy second-hand cannon from army department. Radio K-V-I.

(Continued on Page 174)

How Snow Ball Four-Flushed and Lost

By Clyde Young



"These Were Critical Moments for Snowball."

J. HEATH

LAZARUS Jones Washington Smith arose early. Of course, this had nothing in common with the habits of Lazrus, his arising time as a rule being somewhat later—mostly somewhat. But he was in great spirits. That explains it. He reached for the telephone.

"Gahfield 'tre foah seben," he yawned.

"Hello. Am dat yo' all Winnie?"

"U-huh. Dat's me."

That voice. Oh, that voice. It made Laz's heart pound like a triphammer doing double duty. So soft and melodious. Synchronous note.

"Do you reelize who dis am?" he purred.

"U-huh."

"Could yo' pos'bly ascertain a date wid me on Fawty-fust Av'nu dis eb-nin'?"

"Ah dunno, Laz."

"Aw Win, don' yo' like me since dat Niggah Snowball been hangin' roun'?"

"Well, ah don' feel well, Laz. Ah been cryin'."

"Cryin'?"

"U-huh."

Laz thought fast. That is as fast as the limitations of his educational possessions would allow. Thoughts rushed through his brain with fearful rapidity. But all thoughts hinged on one point—Snowball—his hated rival. He must act. He already felt that something was amiss. That something his clouded vision told him was Snowball. In order to gain time he spoke again.

Winnie!"

"U-huh." That "u-huh" sounded like music to Laz. She heard a society lady use it.

"Wheah am dat lazy niggah, Snowball?"

"Laz?"

"Zacly. Meaning' ebry-thing in the sense of de word."

"If yo' refuh to Mistah White, he am in Bummin'ham."

"Great horn toads an' 'lil apples. Where'd he get de price ob transportem-tashun?"

"From me, Laz. Yo see ah been thinkin'. (Something quite out of the ordinary for her.) Ah been thinkin' I should do something foah de noble upheaval ob dis grate race of ouahs. Ahse gone into reasuch ob science. Ahse gonna pick music from de aiah. Ahse gonna talk through space."

Laz listened intently. He even concentrated, which, of course, was something extraordinary for him. But when a man's in love with a girl like Winnie Jazzbo, he is very apt to do most anything surprising. Turning over her conversation in his mind as she progressed, he came to the conclusion the heat must be having its effect.

"Yoah am gonna talk thru space, Winnie?"

"U-huh."

"Yessuh, jes' say, Hello heah and yo' all heah me here. Fac' is, Laz, we give one big demonstrashun an' wiahluss ball heah at mah house Sat'd'y ev'nin' to which yo' all am cahjulie invahted."

"Miss Winnie ain' you feelin' well?" (Laz had drawn conclusions.) "Does yo' mean t' tell me yoh all can speak foh miles an' miles 'out no wiahs. 'Out no fone like dis one whot I now dissipate?"

"Ah sho' do."

"Well, ahse 'cept dat invahtation. Ise be on han'."

ENTER one, namely, James Snowball White, expositor extraordinary, lately of the White-Jazzbo laboratories, who has entered into terminology and practical research as aforementioned. He was in the outskirts of Birmingham with five hundred dollars of Miss Jazzbo's

currency lookin for antenna's and other information. One would wonder why he did not deal directly with persons handling radio apparatus. Snowball had other intention, however, and was casting his optics in various directions, with his head lifted upward to the housetops. His eyes lighted as he espied a beautiful antenna. His instinct told him there must be a good outfit on the lee end of such a display of aerial alaberacy. Snowball had long since come to the conclusion he was not going to spend five hundred dollars on radio. True, he loved Winnie, but five hundred dollars was five hundred dollars. He must get the receiving set, of course. Get it he would. Snowball long since was noted for obstinacy.

Walking up to the front door of the residence which supported the object of his search he was confronted by an obstacle—a bull dog. But Snowball was speedy and before his Ingersol had moved a hair he had cleared the fence.

A lady came to his rescue, as she was drawn to the front of the house by the angry growls of the canine and the soothing words of Snowball in trying to calm the brute. (From the outside of the fence.)

"Lady, dat sho' am a fine dawg. But jes' now he am wrong. I am heah representing a learned community ob us folks wot wish to purchase some radio equipmunt. Yoh hab' de same on dese heah premises and I thot maybe yoh' all could informashun me regawdin' de pos'ble purchase ob de outfit. May I talk to de man wot operates dat fine antennum?"

"Why, yes; come right in."

"Yes, mam; but ef it's all de same to yoh, lady, would you mine lettin' me see dat nice dawgie on de safe end ob a chain?"

After the dog had been disposed of Snowball was taken to the wireless house and introduced to the owner. A young man of high standing—5BM.

SNOWBALL was in great spirits. The time for the big demonstration and ball had arrived. It was Saturday evening. In the race to win the most coveted hand of Winnie Jazzbo, Snowball had the inside track with a thirty second start on the gun. Lazrus was so far behind he could never overtake him. As a matter of fact, Snowball figured Lazrus was balking at the post and would scratch (meaning out of the race). As Snowball expressed it, "Oh, boy; de prettiest dame in de wurd, wid a bankroll dat spells luxury. My point am seben an' my dice am loaded. May she neber know de truth."

The guests had all assembled and were

more or less nervous. The instruments were set up in one corner, decorated with black chiffon. Snowball wore white gloves and took on, more than the ordinary ham, the aspects of an undertaker.

Parson Ejilah Goosewing had promised to make the introductory address. He arose slowly, the difficulty being that lumbago had at one time made a vicious attack upon him. He adjusted his glasses, coughed, stroked his breast and made a quick gesture as of a man that had not yet learned to swim trying to keep his head above water.

"Ladies and gennelmen," began the minister. "Likewise, brederen and sistern. Permit me to exhibit de excrutiatin' pleasuh ob offerering foh you-al's sureme delectation and joy, uh ebenin' wid dat mos' renoundest scientis' ob the modern age ob the black race—dat is to say, ob de cullud or Affikin race.

"Dis gennulmun what I am a-introducin' is the greatest expositoh what ever expose. In fac', he am of such a renowned and exceedin' ebangelical expositionahy ability day he am been awahded de title ob 'expositoh extraordinary.' Dat means, brederen and sistern, dat he can and does and will expose such a expositionest exposition day you all won't be able to achieve no mental grasp on more'n half of it. Dis heah thing what he gwine expose am de wiahless tellefoam.

"Now, lookahere, brederen and sistern, if you'all am acquainted wid day wonderful and goashamighty grand book, de 'Fore Horse is the Eucalyptus,' den you all knows what is meant by dese terms. Foah, in the Eucalyptus, which am the in-between portions of the Bible, it am writ day in days to come, which now, already, is came, common men and women shall talk here and hear there. An' dat, brederen and sistern, am what is gwine happen right here dis evenin'."

"Us is here, and over dere is somebuddy. And dat somebuddy am gwine talk an' we am gwine hear and de prophesyin' in the big book am gwine be made full of fullfilment like a raisin is wid kick.

"Dis heah expositor what am gwine expose de hidden treasuhs of the natchul, materiul and spirichul worlds, am gwine tie us, you and me which am here in dis room, right up close wid somewhere else. We don't know where at is we goin' listen from, but we is gwine listen away fum heah. And, fuddermore and in addishun hereto, dey ain' goin' be no wires in between. An' dat, brederen and sistern, is de real completion an' fulfillment ob de prophesy. De good book say, 'Dem who is heah shall be heard fum hereafter,' heahafter bein' a Greek word fum de ancient Sands-kè-rit, meanin' today, which comes fum somewhere else.

"An' lissen, brederen and sistern, heah come the miraclest paht ob dis heah miracle. Hit was a broder ob ouah own race, one ob de Senagambians—I stops

to explain, brederen, dat 'Senegambian' is a word deried from de Latin, meaning hit ain't no sin if he gambles—well, brederen and sistern, hit was a Senegambian what made dis heah great discovery.

"Foh de first' time de way has been made plain; de man ob science has done join hands wid the man ob de church, and between and betwux de two, dey is goin' to make the Bible come true wid copper wiahs and hellfire in fohm ob electricious currents, which is not de kine what you-all makes into bootleg wine, but de kine what has a kick jus' de same.

"Bredern an' sistern, look on de face ob your deliverer! Look at him! Don't be feared, he ain't gwine bite—but, oh, boy, he suah can make yaoh mouf come open! When you nigguhs gets done lissenin' to him bring the far fum de distance and make de near sit down approximately, right nex' doah, you all's faces goin' be long like a fishpole and youh eyes gwine stick out like de seven legs ob de mystical jellyfish—yes, I know. I done been dere.

"An' in clunclusion, brederen and sistern, lissen and take heed. In dese heah days dey is too much a-happenin' for a nigguh not to be treadin' de right path. You'all better get right down on youah knees right here—"

At this Snowball reminded the minister hoarsely that introductions was introductions, but "dey ain' nobody come heah foh to heah you-all sermonize, Brudder Goosewing," and the eminent colored divine changed the trend of his appeal to: "Get right down on your knees right heah and greet the man what gwine delivuh de cullud race from his heah state ob intellectual subjection and lead dem one an' all into de promised land ob free gin an fried chicken."

AS Snowball arose, the congregation responded with ethereal, oscillatory applause. A thunderous ovation ensued. Snowball stepped forward, bowing rapturously and at the same time depicting various degrees of the latest African jazz steps.

Lazrus sat in one corner in the utmost entanglements of despair. His chin had dropped considerable while his eyes were like those of a "dope" fiend who had'n't had a "shot" in the arm for days. He was looking for an opening to break this strangle hold that Snowball had fastened so securely upon his accomplishments. He wanted to get away and think. Of course, the vastness of the thing had fastened its fangs deep in the respect of Lazrus, but this was nothing. He could spend a night with a ghost with his thoughts centered on the winning of Winnie. While in these thoughts Snowball was talking:

"People, I will now do all—and more. If yo' will jes' precipitate you' undivided attention and ascertain a mos' conspicuous silence I will now pufohm."

He reached over to switch on the filament. No filament. A frown came upon his highly polished brow. No one was quicker to notice this than Lazrus. Oh, if something only could go wrong! If only the whole scheme would fail! He dare not think of it. But what a tremendous stroke of luck it would be for him.

Snowball was now working frantically over the set. Sweat was oozing from his pores like the Mississippi in flood stage. A little river was running down the table which he was leaning over in his endeavor to get a filament. He had forgotten the combination or something.

He well realized that if the thing did not work he might as well leave town. These were critical moments for Snowball. The most essential phase of the entire situation was the affection of Winnie and her personal regard for his knowledge. To fall down on a mere thing as of a hook-up to battery would be disastrous. He must stall.

"Folks dis wiahluss study ob high frequency am elaborate. De fundahmentahl princahplus are known only to a selected few. Myself bein' one ob dem few. De fust fundahmental am to secuah occilayshums. Dem occulayshums when obtained cause a constant flow of—or—of—Oh, yes, of lava to de condenser wich explodes wid combustshums ob various enfectants to a degree ob dangerous encirclings ob de ground exema."

Here he paused to observe the effect upon his audience. The audience was awestruck with such a flow of vocabulary and trying hard to follow him. Snowball had scored a three-base hit. Still the set was dead.

Winnie Jazzbo was beginning to smell a rat. She wondered if Snowball had thrown away her five hundred dollars with which she had entrusted him for such a good purpose. Had he bought a pile of junk?

Snowball jammed in a plug and, behold—she oscillated. He began slowly and with reverent precision to turn the knobs. The audience gasped and breathed hard as they drew closer, leaning forward with eyes aglow in expectancy. Slowly a voice was being tuned in.

"Hello, 5CR; hello, 5CR; this is 5BM calling at 5YI. Yes, my set was stolen. A colored person came to visit me yesterday and I had to leave the shack on an errand. When I returned he was gone and so was my set—"

Snowball waited for no more. He whirled and tried to stammer something. But Winnie was on him with a wicked looking razor. Lazrus—Lazrus, who had almost given up hope—came to life with a snap and rushed at Snowball with a whoop that could be heard for miles. Pandemonium reigned.

Snowball took the nearest window. He landed safely and went—in no special direction—but he just went.

The Continuous Wave Club of California

Conducted by Lawrence Mott, Associate Editor

EXCELLENT RESULTS FROM 6ALE

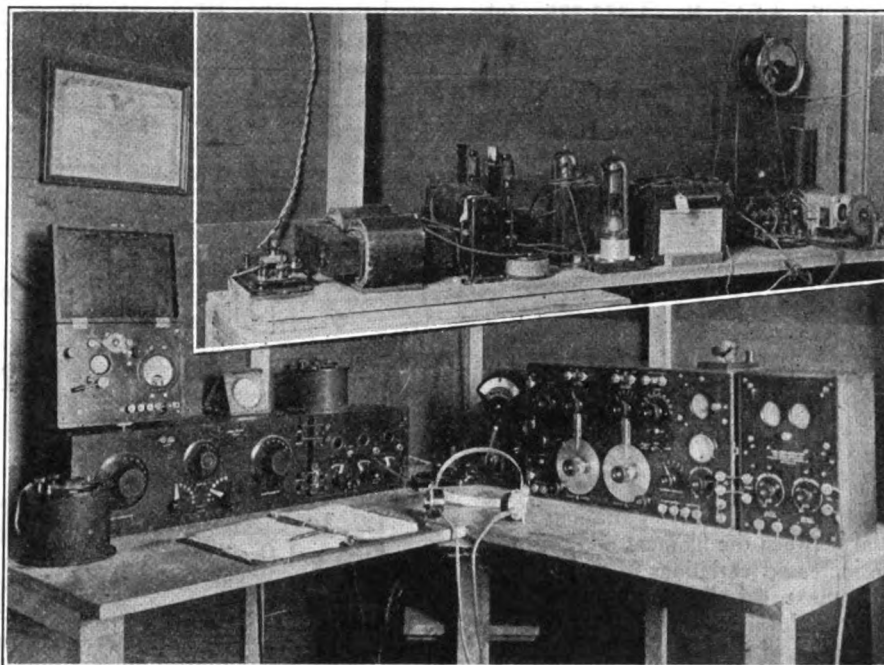
No better argument is needed for widespread adoption of CW than the excellent results obtained by 6ALE at Reedley, Calif. He is advised by 7ZT, ex 7DA, at Portland, Ore., and by 7ZM at Moscow, Idaho, that his signals are the loudest from the Sixth district and by 7ZJ that he is exceeded only by 6ZX. Furthermore, he is being copied consistently by 9AHC, Ellendale, North Dakota, who also says that he is hearing 2FP in New York.

This sending set, which is shown in the upper part of the picture, is owned and operated by W. W. Lindsay, Jr., P. O. Box 643, Reedley, Calif. He will be glad to hear from others as regards his audibility and modulation.

For transmitting, two 50 watt Radiotrons are used with 1500 volts 60 cycle a. c. on the plates. The well-known self-rectification circuit is employed. Filaments are also run on a. c. Voltage is maintained at the correct value by a series resistance in the primary of the step down transformer. The radiation varies with the line voltage from $2\frac{1}{2}$ to 3 amps.

An examination of the picture will give a good idea of the apparatus employed. From left to right appears the relay in primary of power circuit, high voltage plate transformer, filament heating transformer with by-passing condensers of .0024 cap. across the windings; radio frequency chokes are just below this. Next are the plate condensers of .0017 cap. with the two 50 watt tubes on either side, the grid condenser of similar cap. with its leak of 2000 ohms, and behind this the antennae inductance, which has a total number of turns of No. 16 D.C.C. copper wire, amounting to 39, 12 in the grid circuit and 27 in the plate side, with the filament from the center. Inside of this the antennae coil proper slides, in order to vary the coupling. This consists of 6 turns of No. 6 copper wire, which is self-supporting. At the right is the magnetic relay change-over antennae switch, and a tone wheel with its controlling resistance above it. The tone wheel has been tried with A.C. on the plates, and a very good tone has been obtained, although the signals are not as loud as the straight a. c. C. W. Above the wheel may be seen the antennae ammeter with lead running to the entrance bushing. Keys on the operating table control the relays and switches.

For receiving, a Grebe CR3 is used for all amateur work on 200 meters, while the Wireless Specialty Co.'s IP501 is used for all waves above 300, as the Grebe set does not work very well above this wave.



Radio 6ALE, Upper View Showing Transmitting and lower View Sending Equipment.

Radiotrons and Cunninghams are used for detection, while the amplifiers use Western Electric type of tube. The Magnavox (not in picture) is used where extra loud signals are wanted, especially for music. Music from San Francisco (6XAC) has been reported as being heard one-half mile from the set. A third step of power amplification is used to obtain these results. It consists of a U.V. 712 transformer connected in the usual manner with a 5 watt transmitting tube, with 200 volts on the plate.

The wave meter above the receiver is used to keep a check on the transmitting wave and also for measurements of antennae constants. The antenna consists of two 4-wire cages on 2 ft. crosses, spaced 60 ft. high and 50 ft. long. It has a natural period of above 180 meters and a capacity of .00054 mfd. It requires an inductance of $8\frac{1}{2}$ micro-henries to raise the wave to 210 meters, or only 6 turns of No. 6 copper, about $3\frac{1}{4}$ -in. diameter.

The ground is a buried counterpoise, consisting of 6 wires lengthwise, 80 ft. long, and 3 wires crosswise, 50 ft. wide, with the station in the center. Grounding switches, etc., are provided.

6ALE was formerly 2ARD in New York City, where he did considerable QSS testing. He is planning to put in two 250 watt tubes and is raising his poles to 80 ft. He is figuring on trying out a d. c. generator with tone wheel modula-

tion so as to compare with his present a. c. plate supply.

Mr. Lindsay has measured the actual power in-put of his set with a standard Weston portable direct reading watt-meter, finding that both 50 watt tubes running with 10 volts on the filament draw 200 watts on the primary side of the filament transformer, while the plates under the same conditions take 350 watts, or a total of 550. But as tube sets are usually rated the plate wattage is the only one to consider. For instance, in a spark set the current necessary to run the rotary gap is hardly added to the transformer input. This would tend to show the superior over-all efficiency of the tube set as compared to spark.

His co-worker, Mr. C. H. Weatherill, with a set of similar type with 5 watt tubes succeeded in raising 7ZT, 7OZ, 6AGF, and many other local stations, the power input being 50 watts.

Condensers are of .0017 mfd.

Inductance, $3\frac{1}{2}$ in. diam., 12 turns on grid, 27 on plate.

Antennae inductance, 6 turns of No. 6 inside of other coil. Slide for coupling variation.

Condensers across filament windings are of .0024 mfd. and are essential.

Dubilier protective device is used. Milliammeter is 0-500.

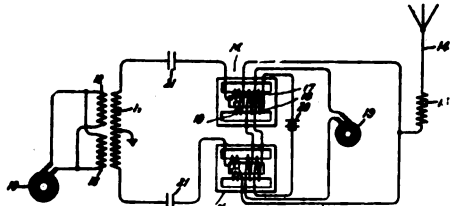
Radiation meter, 0-5.

Radio frequency chokes, No. 250-honey-comb coils.

(Continued on Page 170)

Ernest F. W. Alexander, No. 1,386,830, August 9, 1921—Method of and Apparatus for Producing and Distributing Electric Current Waves of Radio Frequency.

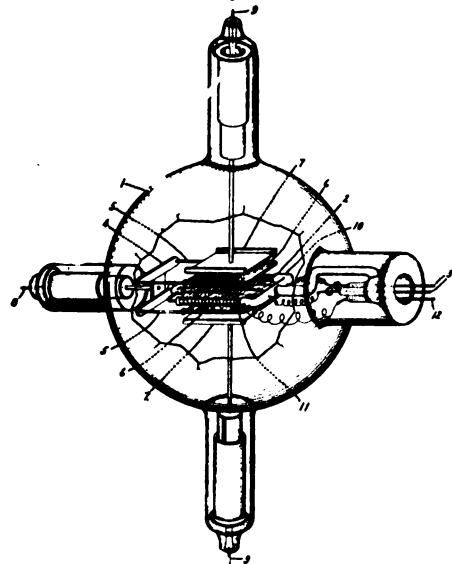
A scheme is described for sending a wave of varying amplitude; more particularly for causing the amplitudes of a radio frequency current to follow a sine law. To do this, use is made of two



parallel paths for the radio frequency current, one including the magnetic controller M and the other the controller N. These are so excited magnetically by the battery 20 and generator 19 that the impedances in the paths M and N vary periodically between zero and a maximum, the arrangement being such that when impedance of path M is a maximum, that of N is a minimum. This periodic variation is at the same frequency as that of the fundamental.

Albert W. Hull, No. 1,385,873, July 26, 1921—Electron Discharge Device.

This patent describes a thermionic vacuum tube so constructed that it has a negative resistance characteristic, which can be varied by a discharge controlling member, 11. If the potential difference between the heated cathode (2) and the plate (7) is made great enough, the emission of secondary electrons from this

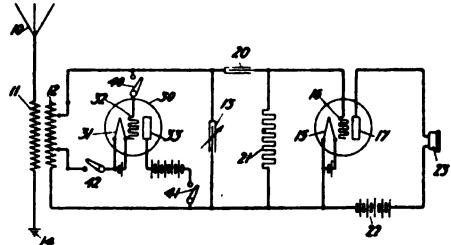


plate, due to bombardment of the primary electrons, increases faster than the primary emission as the potential difference is increased. This reduces the current flow between the anode (4) and electrode (7) as the potential difference is increased. By varying the potential of the controlling member (11), the relative current values are varied. A device of this

sort is much more sensitive than the ordinary tube for the reception or transmission of signals.

Ralph V. L. Hartley, No. 1,387,262, August 9, 1921—Receiving Apparatus for Wave Signaling.

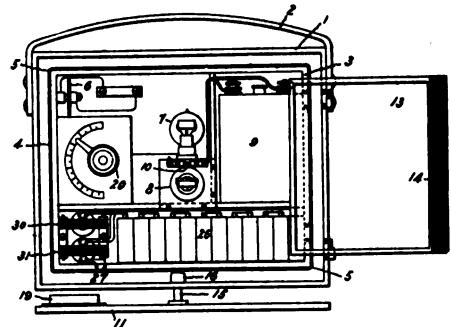
A system is described so arranged that telephonic or telegraphic messages may be received in the ordinary way, or else



by using the heterodyne principle. An ordinary thermionic detector, 15-16-17, in connection with the receiver 23 recognizes signals received by the tuned circuit 12-13. When switches 40, 41 and 42 are closed, the tube 30 is rendered active to generate oscillations of slightly different frequency so as to give beats recognizable by receiver 23.

Reginald C. Clinker, No. 1,386,840, August 9, 1921—Radiosignaling System.

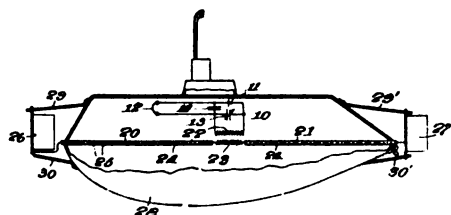
A compact portable receiving set, which does not use an elevated conductor, but instead a coil 3, mounted on the frame



4, which may be turned to get the best effect on pivot 15. In the frame 4 is mounted the tuning condenser and detector. The coil 14 is adjustable for variable coupling with coil 3, and is included in the plate circuit of the detector.

James H. Rogers, No. 1,387,736, August 16, 1921—Radiosignaling System.

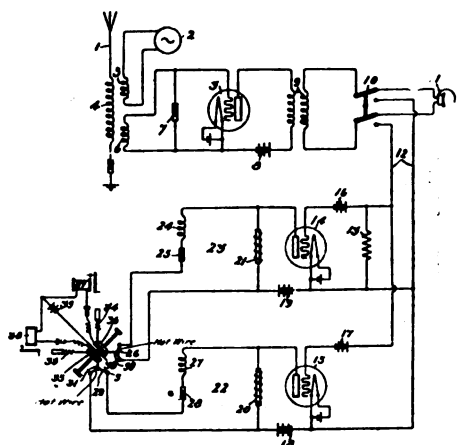
Instead of the usual elevated conductor for the antenna, a horizontal conductor is used, enclosed in a metallic sheath such



as the pipe 24. This conductor may be used on vessels, such as submarines, both for receiving or transmitting. The antenna coupling is effected by transformer 22-23.

Albert W. Hull, No. 1,387,984, August 16, 1921—Negative Resistance.

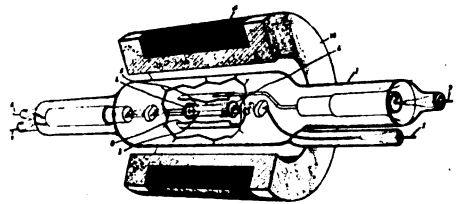
A thermionic device is described, in which the emission of electrons is made so great that the plate or third electrode receiving these electrons emits secondary electrons, which reduces the current flow.



The device thus acts as a negative resistance. Its use to amplify small variations of potential, which is applied between the cathode and the plate, is described.

Albert W. Hull, No. 1,387,985, August 16, 1921—Electron Discharge Device.

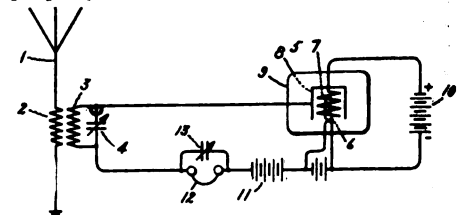
A negative resistance tube is described, having similar characteristics to those in the earlier Hull patents. The control of



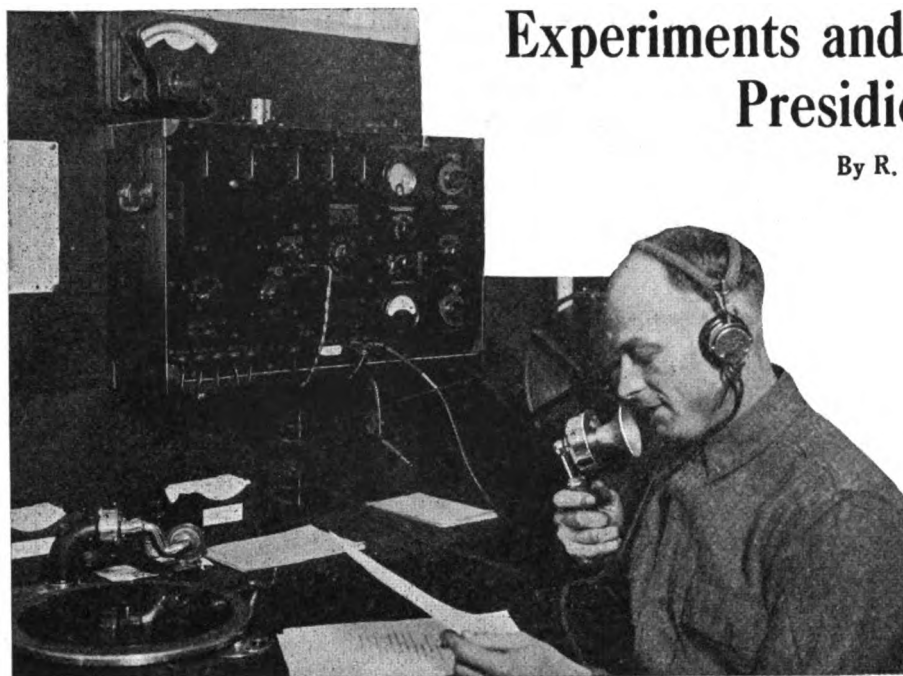
the reception of electrons by the plate or third electrode is in this instance effected by the production of a magnetic field coaxial with the tube, which field may be produced by the current to be amplified.

Albert W. Hull, No. 1,387,986, August 16, 1921—Wireless Receiving System.

A thermionic tube having negative resistance characteristics constructed as described in the previous Hull patents, is used to reduce the damping (due to the resistance) in a receiving circuit to practically zero. This is effected by choosing properly the relative values of the posi-



tive and negative resistances in the receiver circuit. For receiving continuous wave signals, the negative resistance device can be adjusted so as to produce a slightly different frequency from that which is to be detected, so that the beats may become audible.



"Hello! 6XW calling"—Sergeant R. C. Tavers, the man with the million dollar voice."

The experimental work of the Signal Corps School, Presidio of San Francisco, Cal., was commenced about August 1, 1920, with the idea in view of determining the maximum efficiency of some of the signal corps equipment, especially so of the type 67-A telephone transmitter. To this end a considerable amount of work was done in selecting an antenna system, nearly every known type of antenna being tried with varying results. It was finally determined that the principal factor for the proper antenna was the ohmic resistance; the type of antenna having very little to do with the overall efficiency.

The first antenna was of the "V" type, 30 feet off the ground, and two-wire counterpoise, laying directly on the ground. This antenna had a resistance of about 40 ohms, and with it we were able to cover from 10 to 20 miles. This antenna was improved until it developed into a flat-top fan of 4 wires 65 feet high and 12 counterpoise wires raised about 3 feet off the ground. The resistance of this antenna was about 15 ohms, and under exceptional conditions we were able to carry about 900 miles. The present antenna is the "T" type, 4 wires 80 feet high with 16 counterpoise wires elevated 3 feet and the resistance is 10.2 ohms. The "T" type 10.2 ohm antenna carried as far and as well during the poor transmitting season as the 15-ohm fan antenna did during the better transmitting season.

During all these tests the same set and power was used, but the radiation varied slightly, naturally, with the increase and decrease of antenna resistance. With the old "V" type antenna we radiated about .4 ampere, while with the present one our radiation is about .8 normal. One of the

principal factors noticeable in the present installation is the enormous variation of antenna current with modulation of the voice. On a normal radiation of .8 ampere we are now varying the antenna current .2 ampere upward, or to 1 ampere. This would indicate that an excellent percentage of modulation was being obtained. This condition does not ordinarily prevail in the case of a high resistance antenna, say in the neighborhood of 25 ohms. The mere fact that high radiation is being obtained is not conclusive proof that the set will work a great distance when voice modulation is used. During our experiments we have had this fact brought home to us several times very vividly. In one instance we were radiating 2.5 amperes into the antenna with a new arrangement, and with the old set we were obtaining .6 ampere. The .6 ampere radiation was much louder than at 2.5 and both were very clear and distinct. This would indicate that while we were supplying an excellent carrier wave of 2.5 amperes, by our modulation arrangement we were only able to vary or modulate a very small percentage of this with the consequence of a weak voice signal.

As before stated, one of the reasons for opening up this experimental station was to experiment on signal corps apparatus. Another reason was to afford a means of educating the new amateurs just coming into the game and at the same time advocate the C.W. transmission for the amateur with a view of lessening interference. Considerable has been accomplished up to the present in both undertakings. In a recent test made by the school it was shown that there are 320 that are actually interested in the educational matter and concerts transmitted by this station. And from this same test re-

port it was shown that an audience of about 5000 people listen to the radio-telephone concerts. This is very encouraging in that about 60 per cent of these people know very little about radio except how to tune their set, but are very much interested and are glad of an opportunity to learn while enjoying music or other fun. To fill this want and to help in their learning we have established a department at the school for the amateur to answer their questions and help them in their problems both by mail and over the air during our regular concerts. All that we require is that in case they desire an answer by mail that an addressed and stamped envelope be enclosed with their questions.

With regard to C.W. transmission for the amateur, this method of radio communication is bound to supersede the old spark method, if for no other reason than the fact that the number of transmitting stations are increasing all out of proportion to the number that can satisfactorily transmit on a given range of wave lengths and about all we hear each evening is "break" and QRM. The average spark set is interfering from 50 to 150 and sometimes 300 meters. That is to say, while he is tuned to 200 meters, he can be heard very loudly from 25 to 100 meters each side of his tuned point. This is not so with C.W. It will be found to be exceptionally sharp, tuning within five meters and sometimes less, of the hump, thereby increasing the number of stations that can satisfactorily transmit on the same approximate wave length. There are a number of other arguments for C.W., but this one in itself would be sufficient reason for its adoption. In our operation we expect to acquaint the amateur with C.W. characteristics, give him the practice of tuning it, show him that it will work, that it is not so complicated as they would have us believe, and in general to encourage the new amateur to consider C.W. for his transmitting installation. To this end we have been rewarded with the results of about 25 C.W. stations who are now operating within a radius of 50 miles around San Francisco. By no means do we take the credit for these achievements. We are only one little cog in a gigantic wheel that has been grinding for C.W. for the past year and a half, and many truly wonderful circuits and material have been placed within easy access of the amateur to smooth out the humps of his C.W. problems, and the men who are re-

(Continued on Page 160)

6ZAF Furnishes Astronomical Time by Radio

For the first time radio has successfully furnished the official time for an important astronomical expedition. But in the words of Director W. W. Campbell of the Lick Observatory and head of the party that went into the desert wilds of Lower California to select observing stations for the eclipse of the sun, September 10, 1923, "it will not be the last time." An interesting story is involved in the part played by radio in this expedition and by 6ZAF, who in public life is A. H. Babcock, electrical engineer for the Southern Pacific Railroad and an enthusiastic radio fan.

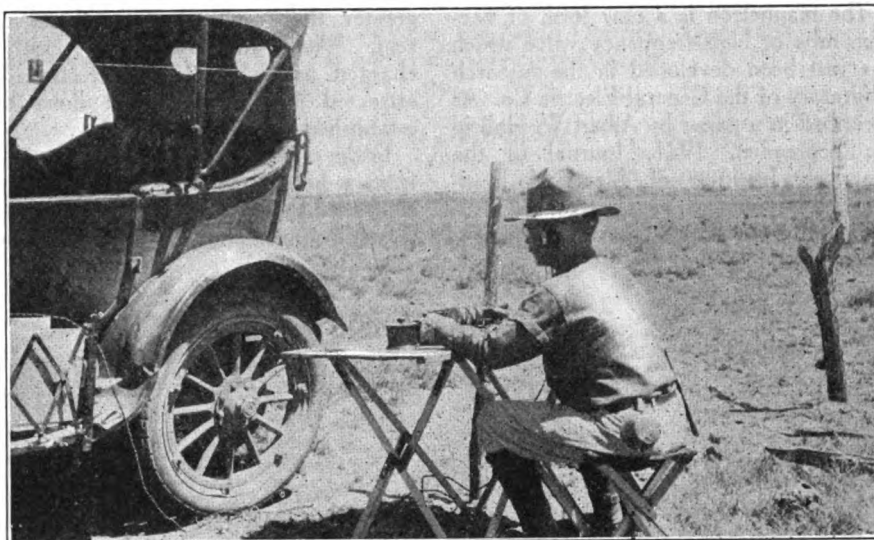
Late in the morning of the day on which this scientific expedition was to leave San Francisco, Director Campbell telephoned to Mr. Babcock that the chronometer on which they were to depend in making their observations of latitude and longitude had been broken and could not be replaced at the last minute. Whereupon 6ZAF said that if he could get together a receiving set and one of those devices that have made the dollar famous no chronometer would be needed. The time signals from San Diego would be more accurate than any single chronometer and could easily be picked up 200 miles away.

Director Campbell was sceptical, but carried away by the boldness of the plan and the necessities of the occasion, doubtfully consented to try the experiment. Through the courtesy of the Colin B. Kennedy Co. and Leo J. Meyberg, Mr. Babcock was able to assemble a simple, portable set.

So the first week in September saw this set as an important element of the equipment loaded into the automobile that carried the party from San Diego into the desolation of the desert hills and canyons to the south of the boundary between California and Mexico. The path of the eclipse will cross this inaccessible region whose clear atmosphere and lack of moisture is the astronomer's delight. The set was the joke of the party during the trip.

But, arriving at the scene of action, Mr. Babcock quickly strung 150 feet of aerial from a tree to a fence post, made a counterpoise, hooked up to the automobile battery, and at noon on the seventh of September, picked up the time signals and established their position.

Director Campbell vows that never again will he be without a radio set and any day we expect to hear that Lick Observatory is so equipped. At such time we hope to publish an illustrated description of the station and two years from now to chronicle the part played in the observation of the eclipse when Einstein's theory will again be tested.



6ZAF Picking Up Radio Time Signals in Lower California.

SCOTTI GRAND OPERA BY RADIO

Giving pleasure to an audience of over 5000 people in seven states was the unique experience of five brilliant stars of the Scotti Grand Opera Company on September 29 at San Francisco. As most of our Western readers enjoyed this opportunity to listen in on this great concert treat broadcast by the Leo J. Meyberg Company from the Fairmont Hotel, they will be interested in knowing some of the details of transmission and reception.



—Photo J. M. Eaton, The Bulletin. . . .
Queena Mario, Joseph Hislop, Myrtle Schaaf
and Mario Laurenti, Singing the Quartette
from "Rigoletto."

The entertainment was made possible through the co-operation of the San Francisco Bulletin and Earl C. Ennis of the editorial staff, with Sheldon N. Petersen, manager of the Meyberg Company, who carried out the experiments necessary to overcome distortion and bring in the musical accompaniment so as to blend with the voices of the singers. The soloists sang directly into the phone and the quartet directed their voices upward into a horn suspended over their heads.

Mario Laurenti sang the "Toreador's Song" from "Carmen," while the quartet

from "Rigoletto" was sung by Queena Mario, Myrtle Schaaf, Joseph Hislop and Greek Evans.

The largest single audience reported was at Santa Rosa, Calif., where 700 persons listened to the music as given by the Press-Democrat's receiving set, in charge of Armand Saare, using a three-step amplifier and Magnavox. Sebastian Ruth of Olympia, Wash., reported good reception for an appreciative audience, as did also the base hospital at Palo Alto, when 30 patients listened in and likewise the State hospital at Agnews. Among hundreds of letters received were those from 7XD, Bozeman, Montana, 7XD, Billings, Mont., 7QL, Ranier, Ore., H. Romander, Smith River, 7TH, Walla Walla, Wash., and 6ARE, Auburn, Calif.

S. F. RADIO CLUB ELECTS NEW OFFICERS

Newly elected officers of the San Francisco Radio Club, Inc., include the following: President, H. W. Dickow; vice-president, C. Thompson; secretary, S. Fass; treasurer, C. Shomaker; Sergeant-at-arms, R. Burgess; Chief operator, C. Lane. The new officers were installed on Oct. 13 by Arthur H. Halloran, editor of "RADIO." The affair was one that no member of the club will ever forget. A stag party, radio raffle, refreshments, special radio telephone concert from the Fairmont Hotel station, lectures by Major J. F. Dillon, U. S. Radio Inspector; A. H. Halloran and T. Lambert of the Radio Shop, San Jose, were on the program of the evening. Mr. Lambert demonstrated his new universal long and short wave receiving equipment. A membership drive of the evening added a number of new candidates to the ever increasing roll of the club.

The Magnetron—a New Synchronous Detector

The magnetron is a new form of vacuum tube or high frequency valve which has just been developed in the research laboratory of the General Electric Co. As described in a paper by Albert W. Hull in the September, 1921, *Journal of the American Institute of Electrical Engineers*, this youngest member of the electric tube family differs from the kenetron,

greater the resulting unidirectional current. When the anode is positively charged, as on Fig. 19, the electrons are attracted to it and current flows thus established.

In the pliotron the current that can flow from a hot filament to a cold anode is controlled by a grid which acts as an electrostatic screen, shielding the hot filament

a simple kenetron arrangement. A solenoid (S), supplied by a battery (B3), superimposes a magnetic field parallel to the axis of the tube. If this field is weaker

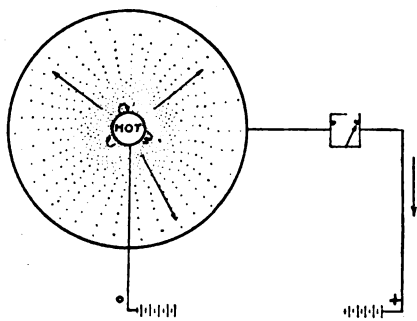


Fig. 19.

the pliotron or audion, and the dynatron chiefly in the method of controlling the flow of current between metal electrodes in vacuum. In its application as a synchronous detector in continuous wave telegraphy in the transoceanic receiving station of Radio Corporation, the magnetron acts as a simple high-frequency valve opened and closed at approximately signal frequency by a locally generated magnetic field, letting through first the positive peaks of the signal and then the negative, giving an audible tone. It is also being

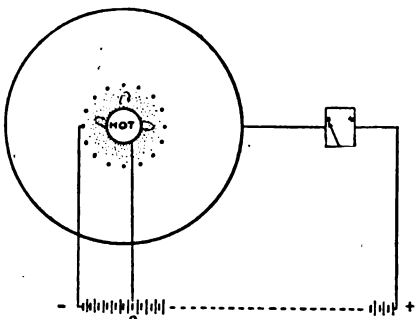


Fig. 20.

adapted to use as an amplifier and as a generator of high-frequency alternating current, a 25 kw. output already being possible.

So as to understand the principle of operation, first consider the kenetron rectifier, wherein the control of current from one metal electrode in vacuum to another is controlled by the temperature of the electrodes. The minute electrons, like little cannon balls, jump out of the hot filament, fly across the vacuum and plunge into the anode. The hotter the filament the greater the number of electrons emitted, and consequently the

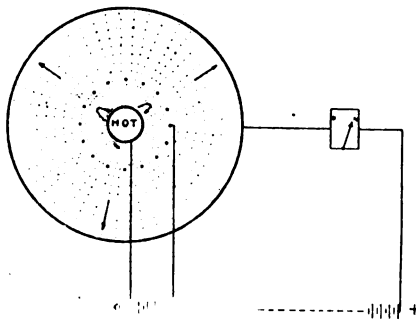


Fig. 21.

from the positively charged cold anode. This grid is indicated by the circular series of dots in Figs. 20 and 21. In Fig. 20 the grid is at a negative potential with respect to the filament and repels the electrons so that they pile up around the filament and prevent any current flow. The valve is closed. In Fig. 21 the grid is positively charged and pulls the emitted electrons away fast enough to give a large current. The valve is closed. Obviously, with an alternating current the valve is

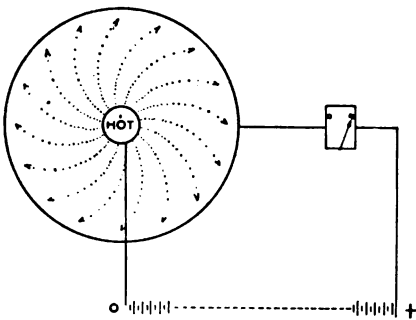


Fig. 15.

open for only one direction and the current is rectified.

In the magnetron, instead of depending upon the heat of the filament and the difference of potential, as in the kenetron, or a positively charged grid as in the pliotron, control of current flow is maintained by magnetic field, as shown in Fig. 4. The cathode is a straight tungsten filament, the anode a circular filament and the magnetic field is created by a solenoidal coil wound directly on the glass tube.

Referring to Fig. 4, a battery (B1) heats the filament to incandescence, and another battery (B2) impresses a constant voltage between cathode and anode, the anode being positive. This is

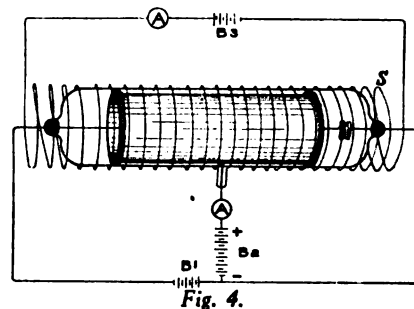


Fig. 4.

than a certain critical value, the full current will flow; if stronger, no current will flow, the magnetic field thus acting as a valve.

This action is indicated in Figs. 15 and 16, from which it will be noted that the superimposed magnetic field causes the electrons to take a spiral instead of a radial path. Fig. 15 shows the condition when the field is weak and the "valve" open, and Fig. 16 when the field is strong and the "valve" open. Similar effects are produced for tubes containing grids.

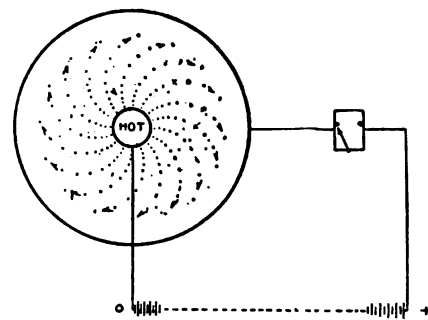


Fig. 16.

In the opinion of Mr. Hull, from whose article these facts have been condensed, the application of the vacuum tube in general and the magnetron in particular to radio will be small as compared to its application to electric power engineering. As a lightning and surge arrester it will protect a d. c. machine or line. "One may predict that one year will see these tubes in use as kenetron rectifiers for series arc lighting. Five years will see them in substations replacing synchronous converters. In ten years they will be on electric locomotives, either as rectifiers, allowing the use of d. c. motors, or as variable frequency alternators, taking their power from a high-tension d. c. trolley line. Twenty years will see d. c. transmission lines, fed through transformers and kenotrons, at any convenient points, by alternations of any frequency, and tapped by the same tubes acting as magnetron alternators."



With the Radio Inspector

This department is conducted by the Radio Inspector of the Sixth District. Questions are answered free of charge. Your name will not be published. Initial your letter only.

Send your Questions to RADIO INSPECTOR'S DEPARTMENT, "RADIO"

Question: Is it unlawful to put an aerial across the street or put it on a telephone or electric light pole? M. B., Hollywood, Calif.

Answer: This is a matter depending on the local laws and regulations. However, usually the power and telephone companies do not allow any wires fastened to their poles, except those of affiliated companies.

Question: If my station is licensed for spark work, would it be necessary to have the license altered so that I may put in a C.W. set? H. C., San Diego, Calif.

Answer: Notify Radio Inspector's Office of such change. No change needed in the license.

Question: Would it be violating my oath of secrecy to make public through press or otherwise the government weather bulletins and official press? PKC., Santa Paula, Calif.

Answer: If the matter is sent out with the prefix "QST to all stations" it may be published. Official press is understood to be directed to naval vessels only, and should not be published.

Question: In what way does an "impact" transmitter differ from the ordinary spark transmitter? What are its advantages? Is there any difference between "impact excitation" transmitters and "impact" transmitters? Where can I get a wiring diagram of either of these transmitters? A. H., San Francisco, Calif.

Answer: Not sufficient space to cover these questions here. Refer you to Stone, "Elements of Radiography," and to the proceedings of the trial between Kilbourne & Clarke and the Marconi Co., and to the Proceedings of the Institute of Radio Engineers.

Question: Is it against the law to use the heterodyne system of reception, which causes oscillations to be sent out of the aerial and possibly interfere with other stations, without a station license? Satoshi Uchida, San Francisco.

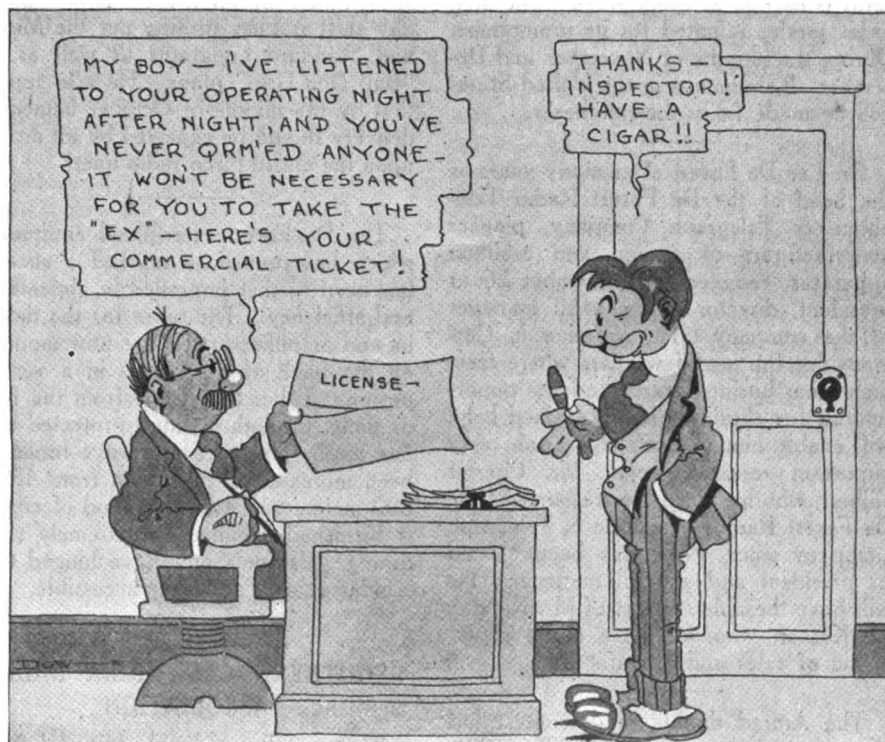
Answer: If the radiation which results from the operation of the station will interfere with the reception of signals or radiograms from beyond the jurisdiction of the state or territory in which the station is located, such station will be operating in violation of the law. (See Act of Aug. 13, 1912, Sec. 2.)

Seventh District Amateur Stations

7SA
7SB
7SC
7SD
7SE
7SF
7SG
7SH
7SI
7SJ
7SK
7SL
7SM
7SN
7SO
7SP
7SQ
7SR
7SS
7ST
7SU
7SV
7SW
7SX
7SY
7SZ
7TA
7TB
7TC
7TD
7TE
7TF
7TG
7TH
7TI
7TJ
7TK
7TL
7TM
7TN
7TO
7TP
7TQ
7TR
7TS

B. C. Barnes
L. E. Bracnt
W. A. Cnemrich
H. L. Fritz
T. L. Richardson
E. E. Griggs
Don Harris
A. J. Homchick
J. L. Garrot
R. P. Heatlie
C. C. Howard
L. C. McManney
C. T. Hanes
R. G. Wascher
W. L. Duncan
M. W. Rice
R. F. Parslow
R. S. Bean
W. F. Turnbow
M. C. Knight
J. A. Kindie
D. G. Harvie
C. M. Landaker
C. L. Hyer
G. M. de Broekert
F. M. Curtin
R. K. Leonard
V. R. Kem
G. C. Perry
G. M. Leasia
G. C. Henny
J. K. Trescott
M. E. Tait
A. W. Emligh
H. T. Hayden
C. A. Lockwood
R. W. Mudgett
H. J. E. Young
A. H. Peterson
J. B. Darragh Jr.
Arvid Herner
J. C. Campbell
H. H. Howell
W. D. Thomson
John Pollak

336 E. 9th St., Eugene, Ore.
1804 Batchelor St., Miles City, Mont.
503 Melrose Ave., Seattle, Wash.
707 N. 65th St., Seattle, Wash.
USOHS, Hospital 59, Tacoma, Wash.
1518 First St., Aberdeen, Wash.
1711 Simpson St., Aberdeen, Wash.
904 First Street, Aberdeen, Wash.
4320 Meridian Ave., Seattle, Wash.
324 F Street, Aberdeen, Wash.
218 E. 63rd St. N., Portland, Ore.
1309 Hood St., Aberdeen, Wash.
906 19th Ave. N., Seattle, Wash.
760 Twelfth Ave., Seaside, Ore.
142 Eleventh St., Corvallis, Ore.
497 E. 28th St., Portland, Ore.
522 S. Main Street, Roseburg, Ore.
579 E. Ninth St., Eugene, Ore.
704 W. Fourth St., Aberdeen, Wash.
3645 35th St. W., Seattle, Wash.
230 Sam St., Monroe, Wash.
206 Montgomery St., Albany, Ore.
R. F. D. 4, Box 17A, Salem, Ore.
816 Thurston St., Albany, Ore.
345 Mill St., Eugene, Ore.
530 Thomas St., Hillyard, Wash.
421 N. Belmont St.
1509 W. Main St., Cottage Grove, Ore.
3712 Woodlawn Ave., Seattle, Wash.
1116 Heron St., Aberdeen, Wash.
Bay Ocean, Ore.
504 N. 31st St., Billings, Mont.
394 Guild St., Portland, Ore.
335 Grove St., Walla Walla, Wash.
Monroe & Cosgrove Sts., Townsend, Wash.
2117 S. 12th St., Salem, Ore.
Powell, Wyo.
1163 E. 17th St. N., Portland, Ore.
2304 N. 39th St., Seattle, Wash.
2560 Fifth Ave. W., Seattle, Wash.
1119 E. Harrison St., Portland, Ore.
Camp Lewis, Wash.
R. 2, Box 15, Medford, Ore.
Wilbur, Wash.
811 Washington St., Albany, Ore.



Things That Never Happened!

Monthly Broadcast of Radio News

Tresco, of Davenport, Iowa, wants to know whether the dealers and amateurs wish him to run another C.W. relay on Washington's birthday.

Leo J. Meyberg Company have moved their Los Angeles store to new and larger quarters, at 950 South Flower street.

Colin B. Kennedy Company state that concerts from their radiophone at Los Altos, Calif., have been heard at Brule, Nebraska.

The De Forest Radio Telephone & Telegraph Company is planning to re-establish their broadcasting station in New York City for the benefit of amateurs within a radius of 400 miles. Feeling that there is a demand for radio telephone news and music in that territory, three nightly concerts of one hour each, to be preceded by a general news program, is being planned. The wave length, time, etc., will be announced later.

The Ship Owners' Radio Service, Inc., is operating chain stores to render radio service to the amateur in exactly the same way as to the U. S. Shipping Board, the U. S. Navy, and many steamship companies, putting Citizen Radio on an equal basis with Commercial Radio. Sorsing is the only company maintaining a chain of stores throughout the United States and in Honolulu and London. A complete stock of every important line of apparatus is carried at every store. The mail order service is noted for its promptness. During the months of November and December all shipments in the United States will be made f.o.b. the purchaser.

Dr. Lee De Forest after many years as the head of the De Forest Radio Telephone & Telegraph Company, pioneer manufacturers of audion and oscillion apparatus, resigned on September 26 as president, director and general manager of the company. He will live in Germany for the next few years where freedom from business cares and the opportunities for obtaining highly trained help, will enable him to complete certain very important research work. Mr. Charles Gilbert, who has been the treasurer of the De Forest Radio Telephone & Telegraph Company since 1915, has been elected its president and general manager. He will have the able support of Mr. Randall M. Keator, who will have direct supervision of sales and manufacture.

The Amrad double prize contest has been extended to December 31, 1921, according to announcement by the Amer-

ican Radio & Research Corporation. Three prizes are offered in the first contest for the best name selected for the new basket-weave, wavy wound, Amrad variometer. Three prizes are also offered for the best name given for the new mahogany finished Amrad regenerative tuners, and detector two-stage amplifiers. Contestants are requested to see the new apparatus at their nearest dealer. They may also obtain descriptive literature regarding the new equipment from their dealer, or request Bulletins O and L from the company direct. Contest blanks may be obtained upon application to the contest department, care the company, at Medford Hillside, Mass.

John Firth & Co., Inc., reports that they are now in a position to make immediate delivery of the Vocaloud. They have been held up by an altogether unexpected and uncalled for mistake on the part of the cabinet makers, who were making the mahogany cabinets in which the instrument is mounted. It seems that an order for several hundred cabinets was placed, and, when long overdue delivery was finally made, it was found that the cabinets were not made in accordance with the specifications furnished. It was, therefore, necessary to place a duplicate order at once, and it is this order which John Firth & Co., Inc., reports is now being delivered and will permit of continuous prompt deliveries of the Vocaloud. Mr. J. Fosner, the production manager, reports that the night shift as well as the day shift is busy turning out the Midget and Standard apparatus as well as the "Bull Dog Grip" plugs. He also reports that by the middle of October immediate delivery should be expected by all dealers upon the entire Firco radio line.

The De Forest Inter-panel equipment, which has proved so marked a success, has been further improved in appearance and efficiency. The tubes for the detector and amplifier panels are now mounted on the back of the panels in a vertical position. Tubes are visible from the front of panel through opening protected by a fine mesh screen. Short wave tuner has been increased in maximum from 450 to 600 meters and a new method of control is furnished, eliminating extremely sharp tuning. Cabinets now have hinged tops, making rear of set easily accessible.

SOUTHERN CALIFORNIA RADIO ASSOCIATION

That a well organized radio club is the best booster the radio amateurs of any

district can use to increase their number is well illustrated in the attendance of the meetings of the Southern California Radio Association. Instead of closing down for the summer months, as is usually the case with most radio clubs, the Southern California Radio Association continued its regular meetings on the second and fourth Monday of each month throughout the entire summer. The attendance at these meetings was never less than 100 and most of the time nearer 150. Better still, fully 30 per cent of this attendance has been non-members and thus becomes one of the best sources for new members of the association.

Beside the regular business of the club, there is always an interesting talk or lecture, either by a member of the club or some outside lecturer. The club has in view a series of interesting and instructive lectures along radio and allied lines, and it is remarkable to see the interest shown and the attention given to the lecturer, many lectures lasting through the entire evening. The club has given a number of raffles in the past year and held a most successful "hard times auction," in which each member brought up some of his apparatus (no longer in use at his own station), and the same was auctioned off to the highest bidder. The sales of old apparatus that night amounted to in excess of \$150.

The Southern California Radio Association at its own expense sent a representative to the first annual A. R. R. L. convention in Chicago. Mr. V. M. Bitz, radio 6JD, represented the club, and we expect to have the pleasure of a very interesting evening listening to his story of the convention.

The club also has its lecturer whom it loans out to other societies. This lecturer, Mr. Edward T. Lowe Jr., assisted by the writer, recently gave a lecture before the biological branch of the Los Angeles Academy of Sciences with a demonstration of wireless telephony. The club considers its position enviable in that it has the complete co-operation of all the radio dealers in Los Angeles, the same facilitating its operation in many ways.

The Radio Club has done much to increase the general public interest in radio in Southern California, and this in connection with the increased use of the amateur wireless telephone and wireless concerts has been instrumental in interesting many men of mature age who, not caring to learn the code, enjoyed listening in for the concerts, and as a direct result, the club has on its membership roll a large number of the representative business men of Los Angeles.

LEX B. BENJAMIN.

CUTTING AND WASHINGTON RADIO STATION

Cutting and Washington Radio Corporation, 6 and 8 West 48th Street, New York City, N. Y., is operating a shore station at Easthampton, Long Island—call letters "WSA"—about 100 miles from New York City. The station handles general public correspondence to and from ships at sea and is equipped with special designed apparatus for both long and short range communication on wave lengths of 600 to 1900 meters. One of the characteristics of the specially designed transmitting equipment is the distinct tone of the spark which enables ship operators to pick WSA's signals out of a jam of signals from other stations and which also has excellent carrying qualities.

The antenna is a "T" type cage with cage "lead-in"—the antenna being supported by two steel towers each 165 feet high, topped off with 10-foot spars. A counterpoise grounding system is used which has proven very effective.

Calculations by all of the known methods indicate that the radiated power is conservatively three kilowatts, which experience has shown to be quite sufficient for long daylight ranges. It might be of interest to point out the fact that a power radiation of three kilowatts on the average ship would require from 50 to 55 amperes antenna current with an "L" type antenna about 75 feet high above deck and 225 feet long.

Some examples of the ranges covered by WSA are as follows: Signals were copied at night by the S. S. Black Arrow while a few hundred miles off the coast of Spain on her last voyage. Traffic was exchanged with the S. S. Essequibo over 1000 miles south of New York at night—signals from WSA being reported very QSA at the time and very easy to copy through QRM. WSA is consistently heard by ships in Bermuda Harbor in daylight. The S. S. Lapland communicates with WSA regularly from 500 to 800 miles in daylight. The S. S. Aeolus communicates with WSA approximately 2000 miles at night. These are not examples of "freak" work, but of every day communication since on "freaks" WSA has been copied in the Pacific Ocean, in Buenos Aires Harbor, in the English Channel, and at other exceptionally long distances.

To facilitate the rapid handling of traffic there are direct private wires to New York City. An office maintained in the Hotel Commodore, New York City, is also connected with WSA by direct private wire and delivers messages to steamship owners by telephone—all such deliveries being followed with confirmations

by messenger. A crew of expert operators was also selected for ability in accurate and rapid handling of traffic.

In co-operation with the Hotel Commodore press is sent nightly at 12:15 a. m. 75th meridian time on 1900 meters free of charge to all ships at sea. The transmitter at WSA is remotely controlled from the Hotel Commodore office for this purpose.

BREMERTON, WASHINGTON

The Kitsap County Radio Association was formed in February, this year, with an initial membership of about 25. Considering that the joint towns of Bremerton and Charleston have a total population of only about 20,000, we consider this a good showing, and have increased our membership to 35, with new members coming in right along.

Until recently we maintained quarters in Union High School here, but are now forced to find other club rooms, due to lack of space to accommodate us during the school year. We are desirous of finding suitable quarters to house not only our members, but a complete station, most of the apparatus for which we now have, consisting of $\frac{1}{2}$ kw. rotary transmitter and De Forest unit panel receiver and amplifier.

Reorganization of the association has just recently been completed, with a view to broadening our work this coming season. We have a code practice table and instruction for half to one hour is given each meeting. As the majority of our members are new in the radio game, code practice is needed. We have only two licensed amateurs at present, but many more on the verge of blooming forth with a ticket. Great care is used that no one without license, uses any manner of transmitter in violation of the law. Several transmitters are almost ready to break forth, but are silent until licenses are obtained. At present, no satisfactory transformer station is established here for traffic purposes. Nothing but a spark coil, but several sparks and tubes coming up.

Personally, I have a 500-cycle Telefunken transmitter nearing completion, and a 15-watt tube-telephone-telegraph set, with which I hope to handle DX traffic.

Receiving conditions locally are poor and have always been, experiments having been made for several years by the local navy station (NPC) to better conditions, with the final conclusion that it is atmospheric or natural causes. However, short-wave stuff as far as Los Gatos, Calif., is heard pretty well here on detector and no amplifier.

Kitsap County Radio Ass'n.

By Howard S. Pyle, Vice President.

DEVELOPMENT OF RADIO TELEPHONE AND C.W. IN SOUTHERN CALIFORNIA

The usual crowd, gathered in Wesrad's store the other day, began swapping reminiscences, and it was amusing to reflect on the rapid development of the radio telephone and C.W. during the past year. Such tremendous strides have been made that contemplating the future—yea, even the near future, is a thing of only the wildest conjecture.

A little more than a year ago, Western radio burst forth on the ether with the first vacuum tube telephone transmitter in this locality. The effect was startling, although the phonograph concerts were much worse than the worst concerts you hear nowadays. On one particularly good night, a conversation was carried on with 6NY, in Whittier, about 20 miles distant. This was stimulating and experiments were "carried on" with renewed vigor. The transmitter, at that time, employed four De Forest tubes, little better than amplifiers, and using the De Forest system of grid modulation. The four tubes were all used as oscillators and the radiation meter ambled up to one-half an amp on state occasions. Those were the happy days!

Then Arno Kluge began juggling the intricate parts of a telephone transmitter and tests were carried on over the intervening blocks with beautiful regularity. Very shortly after Lex B. Benjamin, 6MK, and president of the Southern California Radio Association; and C. E. Blalack, 6JE, entered the C.W. field and from then on new radiofones appeared at frequent intervals.

At the present writing there are about 20 telephone transmitting stations operating in Los Angeles. Some of these stations are concert sets operated by the various dealers on scheduled evenings and the foremost transmitter is Wesrad's 50-watt set, which entertains all the surrounding countryside on Tuesday and Friday evenings.

It is interesting to compare the present 6XD transmitter with the original described above. The circuit has recently been changed and improvements are made almost every week. A great deal of experimentation is necessary to bring this size of transmitter to the point of perfection which it is desired to obtain. The present circuit is a great improvement over previous circuits used and in a coming issue the complete diagrams and data will be shown in these columns.

The Western Radio Electric Company has been foremost in their activities in introducing radiofones and C.W., as it has been their policy to remain abreast of radio advancement for the benefit of the trade. The Oakland store of this company will carry the same policy of sales and service into the San Francisco bay district.

Static Statistics from Everywhere

By Squawk McGuff

I find in a recent editorial from Spokane that they are hearing concerts from San Francisco, and that Spokane, whom we do not hear much about, is there, nevertheless. It is easy to understand the infectious enthusiasm of those people in Spokane when we get the proper "kick" in hearing concerts only a few miles. They hear them over 1000 miles. A sport that includes hearing things 1000 miles away offers the sort of thrill that cannot be disregarded. For some time radio telephones have carried music 1000 miles, and more over water, but inland transmission is much more difficult, as we all know, and to have heard the San Francisco concert was a noble treat for the Spokane enthusiasts.

The persistence of science constantly increases the effective radius of wireless communication. It is only about twenty years since wireless transmission over a few yards was considered something akin to a miracle. Today the range is 10,000 miles and the limit is not yet reached.

Marconi himself suggested the possibility of interplanetary communication. He has heard wireless signals that he does not think can have emanated from any source on the earth. They can be caught only by apparatus tuned to wave length five times greater than any wave our scientists know about. In 1924 Mars will be closer to the earth. Let's all wind a houseful of loose couplers for that wave length.

LOS ANGELES

The fellows are now getting together their resources for the winter campaign and there is much visiting, inquiring into ways and means and various other maneuvers conducive to general activity. There is also very much use of mild (?) language when the oil runs out of the condenser. These are happy times in the life of the amateur.

Some fellows brag about hearing ten feet from the cans, but that's nothing. The ash man can hear a block from his'n, and he doesn't have amplification, either.

Seems like these wireless telephones that are sending messages out over the air for the boys to pick up by radio are rather disturbing. As they listen they recognize the high pitched voice as belonging to "wimmins" and now they are all talking of installing a set with high tone. It's getting so now that if a fellow wants to be admitted to the sacred sanctum of a long distance listening-in station he must take a girl along with him to call out in an upper "C" tone "it's me!" when the chain will drop, the bolt slide and the key turn to reveal—. Now let's see, was that 6MH or who was it?

6JD took a trip one day
To the Con of the A R R L.
He made a speech and then returned,
And is now feeling pretty well.

That sounds pretty reasonable, let's try another!

In Whittier, the 6AHA (Ah, ha!)
Where the tunes are trained to a nice tra la,

Lives a gay young swain on pleasure bent,

And many is the message he has sent.

FEATURES IN THE DECEMBER ISSUE OF "RADIO."

A. J. CHAMPREUX, engineer Pacific Telephone & Telegraph Co., will tell all about the Catalina Island Radio Installation, including details of connections between the radio and the ordinary two-wire telephone circuit, duplex radio telephoning with simultaneous telegraphy and automatic radio signalling system.

JENNINGS B. DOW, U. S. S. California, will start the first installment of a remarkable "C. W. Manual."

B. F. McNAMEE will continue the how and why of radio tuning with an article on "Tuning Apparatus."

PROF. A. K. ASTER, University of California, contributes a helpful technical article on radio frequency amplification by means of the "Armstrong Super Hetrodyne."

Special Christmas fiction, verse and humor in addition to all regular departments.

TACOMA

On of the last four days of September Tacoma had a great electrical display. The committee in charge of this exhibition offered the Radio Club of Tacoma free space if they would bring down their home made apparatus and show the public what they are doing. The Radio Club built their booth and conducted a most successful demonstration.

Horrors! "Fat" Weingarten, our Chicago conventionier, lost five pounds while East. He says now he will answer to the name only of Skinny. He must have had some time there, though.

Our club janitor is now passing out highly embossed cards, reading "my game is wireless" as his motto, and informing the members that he has gone into the

designing and construction work. Don't rush, fellows!

Yes, it's really so. Our esteemed professor of C.W. fame has entered the University of Washington. Remember, Otto, don't get into any of the arguments with the professors over there, as you used to argue at club here—although we know you could back them off the map! Good luck, Otto. It sure is lonesome over here without you and your keen wit.

PORTLAND

Portland has been meeting opposition to the new tariff schedule put into effect last month, when it was agreed to give it a two weeks' trial before further discussion as to its merits. This was done, but on account of the lack of co-operation of outside stations due to lack of knowledge of the new schedule, it was almost impossible for the schedule to receive a fair trial in such a short time. As it was soon discovered that it would almost be impossible to refuse tariff going through Portland after the traffic schedule it was decided to temporarily abolish the clause as published in the last P.R.N. stating, "however no traffic will be handled. In the event an LD station says 'QRJ1,' it is up to you to tell him 'QSU tomorrow night at schedule for traffic.'" It is requested that all other centers, having traffic for or through Portland, make schedules to correspond in such a way as to make connections with Portland at the right time.

("Tacoma will not be affected by this request, being a suburb of Portland."—7ZT.)

7JW, who made a tour of the South during the summer and inspected many of the leading stations, seems to have gained some ideas as to station construction, which he is going to try out. Since his return he has sold most of the old apparatus, and from the latest report has just finished constructing a new home made transformer for his new station. If everything goes as expected there will be a large demand for lightning protectors for receiving sets located locally.

During September Portland was honored by the visit of two of California's best, namely 6DP and 6PR. One evening of their visit was spent in a "Hamfest" at the 7XF station, where most of the "gang" had collected. It was here that the two "dippies" of the coast met. The conversation, or "Hamfest" between 6DP and 7DP that followed was too lengthy for print.

The southern stations are not the only ones that are enjoying a good radio con-

(Continued on Page 164)

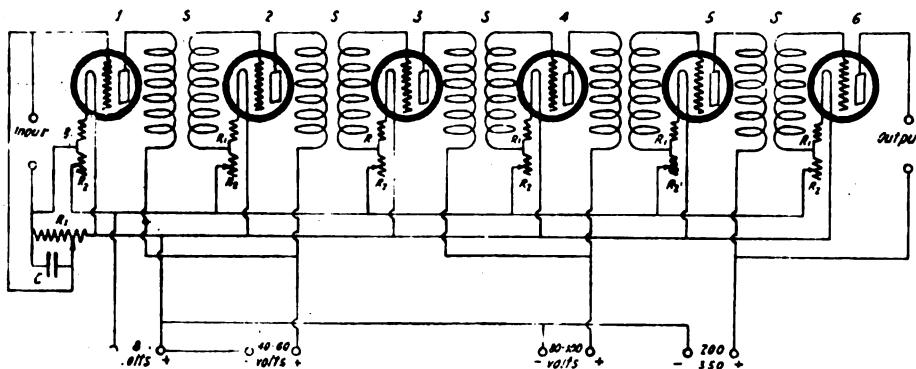
New Apparatus and Supplies from the Radio Manufacturers

SIX STAGE AMPLIFICATION

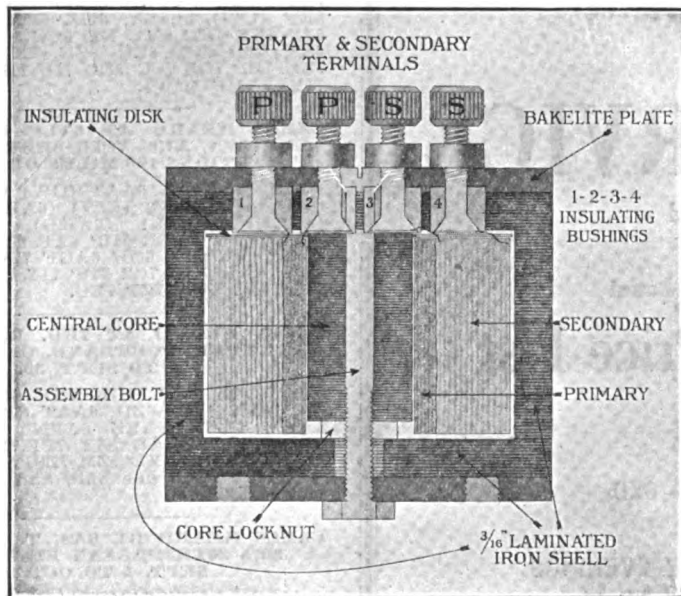
With the new Firco Midget apparatus described in these columns last month it is possible to connect several units so as to get as high as six stages of amplification. The accompanying diagram shows the circuit employed. Ordinary amplifying tubes are used for the first two circuits, but harder tubes are better for stages 3 and 4, with a plate voltage of from 80 to 100 volts. If still higher am-

of the same material. This laminated shield, as it might properly be termed, serves the double purpose of providing a most efficient path for the magnetic flux.

The six-stage amplifier is actually nothing more than three two-stage amplifiers, coupled one after the other by short bus bars. In the same manner, a four-stage amplifier can be built by coupling together two of the Type 37A amplifiers.



Hook-up for 6-stage Amplification.



Cross Section of Saco Clad Transformer.

plification is desired stages 5 and 6 may be added, using 5-watt power tubes and a plate voltage of from 200 to 350 volts. The same filament battery is used for all tubes with an individual filament rheostat for each.

The elimination of howling or squealing is accomplished by the use of the Saco Clad transformer, cross-sectional view of which is shown herewith.

It will be noticed that the primary and secondary windings are wound around a laminated core of silicon steel and totally encased within a laminated wall

Service" than ever. A fine new catalogue of tubes, dials, rheostats, sockets, potentiometers, switches, vario-couplers, variometers and all apparatus parts for receiving sets as well as complete detector and amplifier panels, has just been issued and will be sent on application.

"Radio Apparatus for Amateur and Experimental Use" is the title of a new catalog text which may be obtained from the Radio Corporation of America for 25 cents. It is especially concerned with equipment for continuous wave transmission and receptions, and furnishes the radio amateur with the data necessary for its efficient operation. The publication is in two sections, an instructional and a catalog. The instructional section deals with radiotron transmission, the details of a scientifically constructed station, transmitting tube circuits, their practical use, and general information to the amateur. The catalog section covers radiotron transmission tubes, kenetron rectifier tubes, transmitter accessories, radiatron receiver tubes, receiver accessories, antenna material and accessories. The Radio Corporation has taken the initiative in gathering this valuable information and it is thought that it will go a long ways towards popularizing continuous wave transmission.

Crossley Manufacturing Co., Cincinnati, Ohio, have issued several interesting circulars descriptive of their lines. Among these is a simple variable condenser operated by a cam so as to open and shut like a book, thus giving a uniform variation from .00006 to 0008 mfd. Another is a four prong V-T porcelain socket designed to prevent short circuit through careless insertion of tube, and adapted for side or base mounting.

The Chelsea Radio Company has recently developed an audio frequency amplifying transformer whose electrical characteristics are unusually well proportioned for the best operation with the new high impedance vacuum tubes. The characteristics given below were derived from an 800 cycle Vreland oscillator and the 1,000 cycle data computed for general comparison purposes.

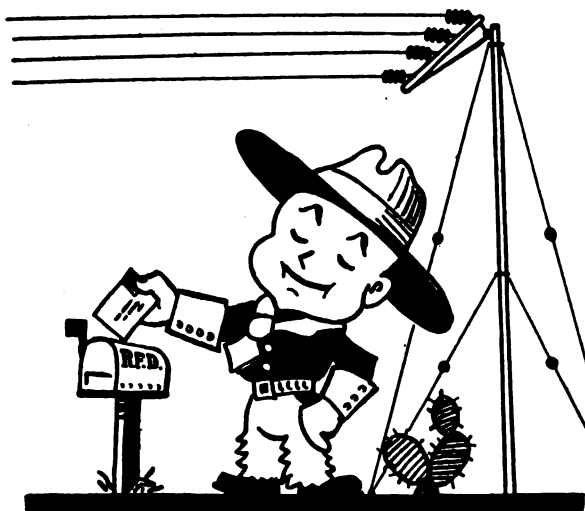
	1000 cycles	800 cycles
	ohms.	ohms.
Primary, Secnd'y open.....	36,175	29,000
Primary, Secnd'y shorted....	1,875	1,500
Secnd'y, Primary open.....	1,875,000	1500,000
Secnd'y, Primary shorted....	55,000	44,000

The notable feature of this device is the high value of secondary impedance with the primary shorted. The core is of the shell type which greatly reduces stray fields, and the coil is of square section and results in an unusually high space factor. The connections have been so arranged as to eliminate all capacity effects between the primary and secondary windings.

NEW RADIO CATALOGS

Catalog No. 21 from the Marshall-Gerken Co., Toledo, Ohio, is devoted to the Mageco System of Radio Telephony and Telegraphy. It contains illustrated descriptions and prices of both transmitting and receiving sets, as well as of all essential assembly parts.

E. T. Cunningham (Audiotron since 1915) and Remler Radio Manufacturing Co. have moved their offices to 248 First street, San Francisco, where larger quarters and greater manufacturing facilities will give either better "Cunningham



There's a "ham" who lives miles from L. A.,
Where coyotes and cactus hold sway,
When he wants something fine
In the Radio line—
Just writes us, and gets it next day.

AND THERE'S MORE TRUTH THAN POETRY
IN THOSE LINES

WESRAD SERVICE

Once Tried—Is Always Used

Let's Get Acquainted Thru Our Latest

Stock Bulletin and Price List

Alias "Price Dictionary"

6XD — CONCERT SCHEDULE — 6XD

310 Meters—8 to 9 P. M.

TUESDAY, WEDNESDAY AND FRIDAY EVENINGS
SUNDAY MORNING CONCERT, 10 TO 11

"QSA—Fifteen Feet from the Phones
in Santa Cruz on One Step"

Western Radio Electric Co.

550 South Flower
LOS ANGELES

274 Twelfth Street
OAKLAND, CAL.

Special Distributors for Burgess "B" Batteries

CALLS HEARD

CALLS HEARD BY 7MQ, CORNELIUS,
OREGON, JULY 20TH TO SEPT.
10TH—ONE TUBE ONLY.

Spark—6AE 6AR 6AID 6AAW 6AQU
6AAT 6AVB 6ACR 6AWH 6AEW 6ANW
6AFJ 6APE 6ABX 6AMR 6AMW 6AGF
6BK 6CH 6CO 6CV 6DP 6EA 6EB 6FH
6FR 6GF 6GR 6GN 6HC 6IC 6KA 6OC 6OH
6PJ 6TH 6TV 6VX 6WX 6WZ 6ZA 6ZK
6ZU 6ZX 6AVT 6ABX 6LV 6II 6IS 6KK
7AD 7AY 7BA 7BC 7BN 7BK 7BP 7CC
7CN 7CW 7DP 7ED 7EO 7FR 7GA 7GD
7GN 7IN 7IU 7IW 7IY 7KB 7KG 7KJ 7KN
7LW 7LS 7NA 7NN 7OZ 7QQ 7TZ 7XD
7YG 7YS 7ZJ 7ZK 7ZL 7ZN 7ZT 7ZW.
5BR (Canadian).
C W—6AWT 6ASJ 6AAT 6AWV 6AUL
6ALE 6ALU 6XAC 6XG 6XW 7HW 6MS
7NY 7QE 7RV 7XF 6AGC 7VW.

HEARD BY 6AUN FOR SEPT. 5-20, 1921.

6AE 6EA 6ER 6FK 6FR 6GI 6GE 6GR
6IB 6IC 6KA 6LC 6MH 6MN 6OH 6PO
6OK 6TV 6VM 6ZA 6ZU 6LX 6AAK 6AAT
6ACR 6ACY 6ADL 6AGF 6AID 6AIL
6ALE (CW) 6AOZ 6AQU 6ASR 6AVB
6AWI 6AWH 7BK 7BP 7BW 7CC 7GI 7IU
7KM 7KJ 7KW 7MZ 7OZ 7XO 7XF (CW)
7ZJ 7ZM 7ZJ 7ZT.

HEARD BY 6AVM, 2318 K STREET, SAC-
RAMENTO, CALIF., ON ONE TUBE,
FROM SEPT. 18 TO 28.

5ZA 6AGF (6ANJ-fone) 6ACY (6AFN)
6AWV (CW) 6AEI 6AJH 6AVY (CW) buz-
zer, 6ALE (CW) 6ALU 6ATQ 6ADL 6AEZ
6ATH 6AVD 6AWT (CW) 6AVR 6CP 6DP
6EF (CW) buzzer, 6EX 6FK 6GI (6IM)
6JY 6KS 6KC 6MH NK 6OC 6OD 6OM 6PJ
6SK 6TU 6VX 6ZB 6ZN 7XD 7BK 7ZT
7ZM 7BP 7OZ 7CC 7ED 7IU 7MO 7MY 7KJ
7IW 9AMB (CW).

CALLS HEARD AT 6ALP BY HILLIS
BROWN, AUG. 7 TO SEPT. 7—ALL
STATIONS 100 MILES OR OVER.

6PJ 6ZX 6AE 6AAT (CW) 6XAC (CW)
fone 6AID (6KC) (6TV) (6ARW) (6AJH)
(6AED) (6AKL) (6AKD) 6ZE (6ZB)
(6FK) 6OT 6ACR 6DP 6AR 6VX 6TV 6AC
6ANP 6CC 6GF 6OH 6AGF 7IW 7ED 7DA
7HW 7XD 7ZM 7OZ 7PP 7IY 7ZJ 7BJ 7BQ
7HK 7LY 7GA 7ZT 7EO.

CALLS HEARD AT 7RO, R. G. HEIT-
KEMPER, PORTLAND, ORE., AUG.
20 TO SEPT. 30.

6CV 6EA 6ER 6GK 6GR 6IC 6KI 6OH
6PR 6SK 6VX 6ZU 6AAT 6ABM 6ABW
6ABX 6ACR 6AEZ 6AFN 6AGF 6AID
6APE 6AWH 7AD 7AY 7FI 7HF 7IN 7IU
7JF 7KM 7NL 7XD 7ZM 7ZS. All the above
were heard on one bulb and a three-coil
tickler system.

CALLS HEARD BY 6AS, T. B. BROWN,
3675 20TH ST., SAN FRANCISCO,
SEPT. 1 TO OCT. 1.

(6AR) 6AEZ 6AMB 6AID 6ADL 6ALU
6ALE (CW) (6AWV (CW) (6CV) 6EA
6EB 6EN 6FK (6GF) 6GI 6HY 6IC (6IS)
6JD (6MH) 6OD 6SK 6TF 6ZB 6ZN 6ZU
7BP 7BR 7ED 7FI 7GA 7IU 7KB 7KJ 7OZ
7ZM 7ZS (7ZT) 7XD.

CALLS HEARD AT 6AFO, SAN
FRANCISCO

6DP (6EB) 6EN 6FK 6GF 6GP 6GR 6IC
6IS 6KA 6KC 6LC 6MH 6MN 6MZ 6OH
6PJ 6SK 6TU 6TV 6VX 6WI 6ZB 6ZN 6ZX
6XAD 6ABG 6ADL 6AEI 6AGF 6AJH 6ALE
6ALV 6AML 6AGU 6AVE 7BK 7IN 7KP
7KJ 7OZ 7ZT (7ZJ).

CALLS HEARD AND WORKED BY 6EB
FROM APRIL 1 TO SEPT. 23.

6AAH 6AAT 6AAU 6ABH 6ABM 6ACR
6ACQ (6ADA) 6AEI (6AFO) 6AGC (6AIN)
6AJH 6ALE-ICW (6AMW) 6ANO 6APE
(6APH) 6ATQ 6XAD-ICW 6ZAE.
(6AS) (6BK) 6BU 6BW (6FX) 6IM, 6KC
6KK 6PG-CW (6PJ) (6PO) 6TS 6VX
(6WZ) 6ZB-CW (6ZU) (6ZX) (6ZZ).
(7DA) 7IN 7IW (7ZJ) 7ZT and 7ZM.

**CALLS HEARD BY 7OZ, GARRETT
LEWIS, EUGENE, ORE., AUG.
19 TO SEPT. 20**

5BR 6AE 6AL 6AN (6AS) 6AW 6AY 6EB
6EN 6EP 6EX (6FH) 6FT (6GF) (6GR)
6HC 6HP (6IC) (6IS) 6JE (CW) 6KA 6KE
6KM 6KP 6KY 6LC 6MH 6MN (6MK)
(6OC) (6OH) 6OT 6PC (6PJ) 6PO 6PP 6PR
6PW 6TU (6TV) 6VC 6VK (6VX) (YWH)
(6WZ) 6WO 6XW (CW) 6XG (CW) 6XAC
(CW) (6ZN) 6ZU (CW) 6ZY 6ZAC 6ZAE
6AAT (CW) 6AAW 6ABG 6ABG (CW)
(6ABH) (6ABM) 6ABU (6ABW) 6AEX
(6ACR) (6ADL) (6AEW) 6AEZ 6AFA
6AFO 6AFN (6AGF) 6AGN (6AID) 6AIW
6AJH 6AKL 6ALA (6ALE-CW) (6AMW)
6ANK 6ANP 6APE (6AQU) (6ASJ-CW)
6ATQ 6ATV (6AVB) 6AVV 6AWH 6AWI
6AWS (6AWV-CW) 7AD 7AD-CW 7AY
(7BA) 7BC 7BG 7BH (7BK) 7BP 7CB
(7CC) 7CE (CW) (7ED) 7EO 7FI 7FQ (1GA)
7GI 7HW-CW 7ID 7IN (7IU) 7IY 7JJ 7KB
(7KJ) (7KM) 7LS 7LY 7MW (7NL) (7NW)
7QQ 7RB 7XD 7XF-CW and fone 7YA 7ZB
(7ZJ) 7ZM 7ZN 7ZO 7ZS (ZT) 9MH 6AK.

The above stations were worked with
a 1/2 KW. set during ten nights, which
were not consecutive.

The old rotary 7OZ is discarded and will
be replaced with the CW and a new
Quenched gap outfit.

7MF of Eugene has discarded CW and
has the old spark set of 7OZ.

There has been a lot of qrm. from a 500
watt CW set in Eugene at the aviation
field (EF1). This set freezes the tubes
and puts id on the blink till all their traf-
fic is off. The field will be moved about
the first week in October and DX will
start.

This is all from Eugene this month. Will
send you some more next month.

**CALLS HEARD BY 6AWT, SAN FRAN-
CISCO, FROM SEPT. 1 TO 22**

6AE fone (6EA-WK) 6EN 6ER 6FK 6FR
6GI 6GF 6GP (6GR-WK) 6IB (6IC-WK)
6KA 6KC 6KP 6MH 6MN 6OH 6OK
(6PO-WK) 6SK 6TU 6TV 6VH 6VM 6ZU
6ACR 6ACY 6ADL 6AID 6AJG 6ALE-CW
6AOZ 6AQU 6ASR 6AVB 6AWI 6AWH 7BK
7BP 7CC 7FI 7GA 7IU 7KM 7KJ 7KW 7MZ
7NL 7OZ 7XD 7XF-CW 7ZJ 7ZM 7ZS
(7ZT-WK).

CALLS HEARD BY 7MF, EUGENE, ORE.

6AE 6AK 6AR 6CH 6EX 6FH (6GF) 6IG
6KA 6KM 6KX 6MF 6OC 6PR 6TV 6XAD
(CW and music) 6VX (QSA) 6WZ 6ZX
6ZU 6AEZ 6ABR 6AWV (CW) 6AVY
(CW) 7EX 7FI 7HC 7HW (CW) 7IU 7KJ
7KM 7LW 7MA 7NL 7PA 7QQ (ex-ZZ) 7SP
7XF (music) 7XD 7ZM 7ZS YA 9B. Any
one hearing 7MF's CW please QSL.

**CALLS HEARD BY 6EA, H. C. Seefred,
APRIL 1ST TO SEPT 25TH.**

Heard: 6IF 6ZA 6AI 6AS 6BS (CW)
6BW 6CH 6DN 6FH 6FI 6FK 6GO 6JM
6MZ 6PO 6QR 6SR 6TC 6VK 6VL 6WO
6XZ 6ZB (spk. and ICW) 6ZE 6ZH 6ZK
6ZY 6ZZ 6AAK 6AAT (CW) 6AAU 6AAW
6ABH 6ABW 6ABX 6ACR 6ADA 6AFA
6AFN 6AFO 6ALA 6AOY (CW) 6AQW
(CW) 6AWT (CW) 6XAD (ICW) 7FI 7GA
7HN 7IW 7NL 7XD 7YA 7ZM and 9ZN.

Worked: 6AE 6AK 6AR 6CP 6DP 6EX
6GF 6GR 6HC 6IC 6KC 6KM 6OC 6OH
6OW 6PJ 6PR 6SK 6TU 6TV 6VX 6WZ
6ZU 6ZX 6ABM 6AGF 6AID 6AJH 6AKL
6ALE (ICW) 6AMW 6ANK 6APH 6AVB
6AWH 7BP 7DA and 7ZT.

**CALLS HEARD BY 6ACM, A. AND L.
NEWMAN, 1700 SONOMA AVE.,
BERKELEY, CAL., FROM
SEPT. 1 TO SEPT. 30.**

6AK 6AR 6CV 6DA 6DP 6EA 6ED 6EN
6ER 6FH 6FK 6FT 6GC 6GF 6GP 6GT
6HY 6IC 6ID 6IS 6IZ 6JY 6KA 6KC 6KP
6KS 6KX 6LC 6MH 6OD 6OH 6PJ 6PR
6QR 6RS 6RZ 6SK 6TF, 6WI 6ZB 6ZN 6ZU
6AAT (CW) 6ABM 6ABS 6ACR 6ACY
6ADL 6AEI 6AEZ 6AFN 6AGF 6AGP 6AIB
6AIO 6AJH 6AKE 6AKI 6ALL 6ALN 6ALP
6ALU 6ANP 6APE 6APO 6AQU 6ATQ
6AVD 6AVR 6AVV 6AWH 6AWY 6AZD
6AZL 6BAP NK YA 7BK 7BP 7CN 7CU
1ED 7FI 7GA 7GO 7IM 7IN 7IS 7IU 7KD
7KJ 7KM 7MY 7NL 7NU 7OK 7OZ 7RA
7XC 7XD 7YA 7ZJ 7ZM 7ZR 7ZT 6GR.

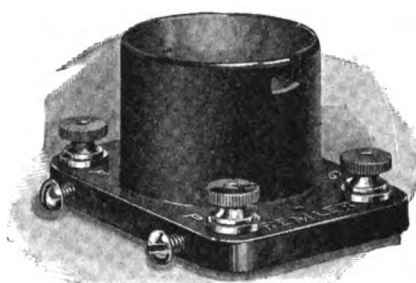
Daylight reception: 6AK 6IC 6FH 6GC
6GP 6KP 6PJ 6AAT 6ACR 6AZD 6AZL
6BAP. Any one hearing 6ACM please QSL.

**CALLS HEARD AT 6ASJ, OAKLAND,
CAL., FROM MAY 12 TO OCT. 2.**

6AE (skp. and CW) 6AP 6CR 6DD 6DP
6EA 6EB 6EN 6ER 6FK 6GI 6IC 6ID 6IS
6IY (CW) 6JE 6KP 6KS 6LA 6LX 6MB
6MH 6MX 6OD 6OH 6OM 6PR 6TH (6TV)
6VX 6WU 6ZB 6ZU 6AAT (CW) 6ABG

DO IT NOW!

Are you missing part of the fun of the game because of poor
apparatus, old apparatus or lack of apparatus you need?
Are you proud of your equipment? Are you getting as good
results as the other fellow—the best results? You should
and can with the right apparatus. Check it over. Stock up.
Make your set efficient, complete, up to the minute, and do
it now. Run your eye down this list, check the items you
need and order them.



Remler V T Sockets.....\$1.50 Murdock Radio V T Sockets. 1.00
De Forest V T Sockets..... 1.40 General Radio V T Sockets. 1.50

De Forest reversible Rheostats.....\$1.75	Federal Amp. Transformers.... 7.00
Remler Rheostats..... 1.75	General Electric UV 712 Amp.
Remler's Jr. Rheostats..... 1.00	Transformers 7.00
Murdock New Type reversible	Remler large Nonbearing Sw... .65
Rheostats 1.00	Remler small Nonbearing Sw... .45
Moorhead E. R. Detector tubes. 5.00	Wireless Shop Panel Mounting Con-
Moorhead V T Amplifying tubes 6.50	densers
Radiotron Detector tubes..... 5.00	De Forest Condensers
Radiotron Amplifying tubes ... 6.50	Murdock Condensers
Radiotron Power tubes..... 8.00	Insulators, 10 in. ....\$1.00
Magnovox New Type "14" horn.45.00	Insulators, 4 in. .... .50
One Stage Amplifier without	Insulators, Ball ..... .40
case .....15.00	Murdock Phones, 2000 Ohms... 4.50
General Radio Amp. Trans-	Murdock Phones, 3000 Ohms... 5.50
formers 5.00	With new type head band, 50 cents
	extra

If you don't see what you want ask for it. Our stock is
complete. Every piece fully guaranteed, and the lowest prices
consistent with high quality, long wear and perfect satisfaction.
You'll like our apparatus and our way of doing business.

TRY IT NOW.

CALIFORNIA ELECTRIC SUPPLY CO.

643 Mission Street, San Francisco

Radio Supplies that R right

A Live Wire Store with a Live Wire Radio Department and a Complete Line of Live Wire Radio Supplies



A BIGGER RADIO STOCK
Our Radio Department has been enlarged and we are now in a position to supply you with whatever you need in the radio line. Anything from the aerial insulator to the ground clamp.

VACUUM TUBES
We carry all of the standard makes of vacuum tubes. Radiotrons, Cunningham and A. P. Tubes, detectors, amplifiers and transmitters, at standard prices.

SAN FRANCISCO'S UP-TOWN RADIO STORE
Do your radio shopping at the "Live Wire" store. In one of the leading residential districts of San Francisco. Why go miles out of the way when we can supply you with everything that you need?

COMPLETE SETS
Built to your specifications. Any wavelength range, at a price that will not burn a hole in your pocket. Special concert sets also built to order.

**Magnavox
Loud
Speakers
All Sizes**



1230 Polk Street

Headsets—

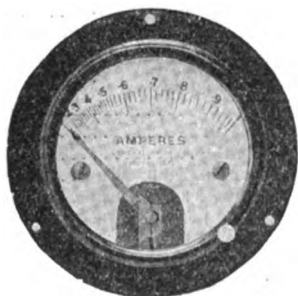
WE carry a complete stock of radio headsets, including Murdock, Brandes and Baldwins. The new Murdock 56's are in heavy demand. Equipped with the new adjustable headband, the "non-hair-pulling" kind, 2000 ohms, \$5.00; 3000 ohms, \$6.00; maximum sensitivity, uniformity in tone, remarkable durability, exceptionally well built. Backed up by the liberal Murdock guarantee.



**New Prices
on Baldy
Phones.
Type C \$13.75**

**"If It's Good
Apparatus
We Have It"**

San Francisco, Cal.



INSTRUMENT REPAIR WORK

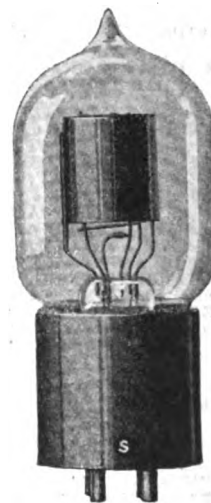
We are equipped to repair electrical and radio measuring instruments of any type, make or size. Scientific, reliable work at moderate prices. Don't throw your burnt-out instruments into the discard. Send them to us for repair. Voltmeters, ammeters, frequency meters, hot wire ammeters, galvanometers and any other type of meters repaired.

Announcement

After a year of extensive scientific, nautical and electrical development work and manufacturing, we have decided to extend our present business scope to cover the entire radio field with a new line of apparatus decidedly different from what you have been accustomed to in the past. The same reliable service that we have extended our customers in the past years will be yours in the development of our new radio department.

VACUUM TUBES—All Makes

We carry a complete stock of every standard make of vacuum tube, both transmitting and receiving. A. P., Cunningham and Radiotrons. Vacuum tube accessories are also included in our line. C. W. apparatus is one of our specialties. Measuring instruments for C. W. transmitters, both A. C. and D. C., are always on hand.



We Stock a Complete Line of C. W. generators in voltages ranging from 500 to 2000 D. C., with either A. C. or D. C. motors. These can be had in 100, 200 and 500 watt sizes. Special Generators built to order. Armature Winding.

We also carry a good line of transformers for every use in a radio station. Standard makes of any type of radio apparatus always carried in stock.

This is Only an Announcement. Watch for Our Ad in the Next Issue

HEINTZ & KOHLMOS, 606 Mission Street, San Francisco, California

6ADL 6AGC 6AGF 6AGU 6AIR 6ALA
(6ALE-CW) 6ALU (CW) 6AMW 7BK 7BP
7CC 7DA 7DJ 7ED 7FC 7IN 7IU 7KJ 7KM
7MF 7NN (7OZ) 7ZJ 7ZM 7ZT 9HM. As I
am working nights, the above calls were
heard between 12 M. and 2 A. M. Any one
hearing my ICW or Voice please QSL.
Chas. L. Elvin, 929 Sixtieth Street, Oak-
land, Cal.

**CALLS HEARD BY 7ZT (EX-7DA),
PORTLAND, ORE., IN SEPTEMBER.**

(5BR-Canadian) 6AE 6AK 6AR (6AS)
(6AV) 6BW (6CH) (6CP) (6CV) 6CW
(6DP) (6EA) 6EB (6EN-CW) (6ER)
(6EX) (6FH) 6FX (6GF) 6GI (6GR) 6GX
6HY (6IC) 6II (6IS) 6JE (6KA) (6KM)
6KP 6LC (6MH) (6OC) (6OH) 6PJ (6PR)
(6QR) (6QT) (6SK) (6TU) (6TV) (6VK)
(6VX) 6WR (6WZ) 6ZB (6ZU) (6ZX)
(6AAT-CW) 6AAU 6AAW 6ABM 6ABW
6ABX 6ACR (6ADL) 6AEI (6AEW)
(6AEZ) 6AFN (6AGF) (6AID) 6AJH
(6ALE-CW) (6AMW) (6AMZ) 6ANK
(6APE) 6ATH 6ATO (6ATV) (6AVB)
(6AWH) (6AWT-CW) (6AWV-CW)
(6AWY-CW) 6AZU 6ZAD-CW ("NK")
"YA" (7AD) (7AY) 7BA (7BC) (7BK) 7CC
(7CE-CW) 7CN (7FI) (7IN) (7IU) (7IY)
7JF (7KJ) (7KM) 7LS (7MP) (7NL) (7OZ)
(7TJ) (7XD) (7ZM) (7ZS).

Krebs, Oklahoma, Sept. 29, 1921.

Editor, Pacific Radio News, San Fran-
cisco, Calif.

I have looked in your magazine and
several others, but without success, so I
am writing to you personally to ask if
there is any such "bird" as 6WV.

If there is, please inform him for me
that I heard his signals here on night of
Sept. 28, about 10:55 to 11:05 P. M. (here).
He was easily readable on one tube and
he was calling 9ZC-5ZA and also CQ.

At the time I was using only one tube,
three Duo-Lateral Coils and only "one"
Variable Condenser, it being shunted
across the secondary coil.

Yours sincerely,
THEO. R. HAMILTON,
Radio 5KZ.

**CALLS HEARD AND WORKED ON A ONE-
WIRE AERIAL ABOUT 80 FEET LONG,
BY 6AAK, SANTA BARBARA, CALIF.**

(6AE), 6AK, 6DP, 6FK, 6FY, 6HC, 6IC,
6KA, 6KC, 6LC, (6MH), (6MZ), 6OH, (6PJ),
(6PO), 6SK, (6TV), (6VX), (6ZX), 6XZ,
(6ZB), 6ZN, 6ZU, (6ZX), 6AAT, cw. and
phone. 6ABO, 6ABM, 6ABW, 6ACR, (6AFM),
(6AGF), 6AIC, (6AID), 6AIP in daylight,
(6AHJ, in daylight p. m.), (6ALE, cw),
6AMW, 6AQU in daylight, a. m., 6AUL,
phone and cw, (6XAD, cw), (6ZAD, cw).

San Diego can be heard and worked in
daylight. My radiation is 2 amperes on full
power. Above calls heard and worked during
August.

6KS ON ONE TUBE:

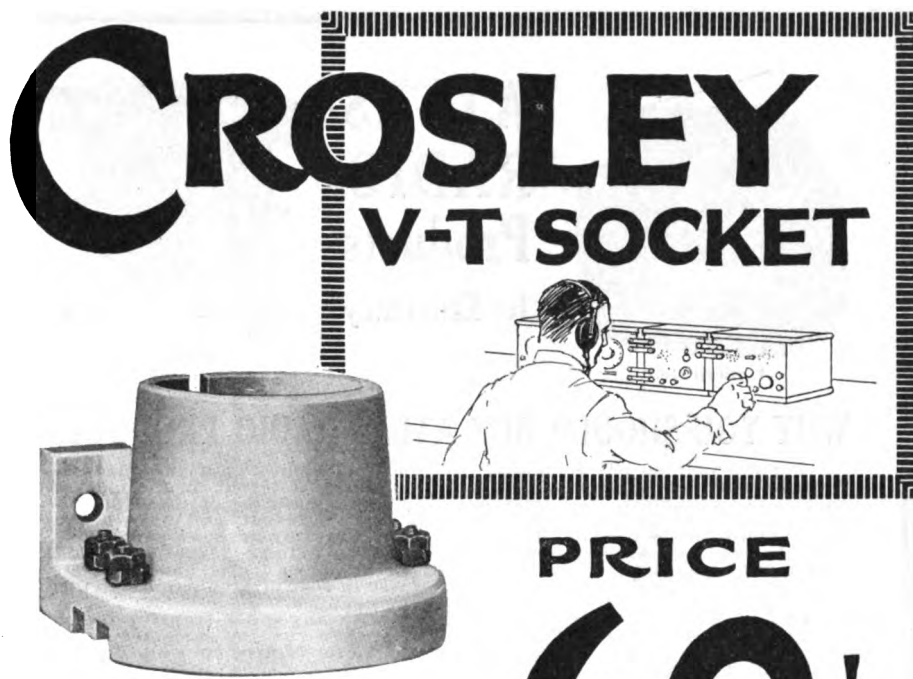
(6ZA), (6AE), (6AI), (6AH), (6AK), (6AR),
6BO, 6BU, 6BW, (6BX), (6CH), (6CP),
(6DP), (6EX), (6FH), (6GF), (6HC), (6HH),
(6IC), (6IM), (6JT), (6KC), (6KM), 6LU,
(6MZ), (6OC), (6OH), (6OW), (6PR), (6QR),
(6QS), (6SK), 6SL, (6TF), (6TH), (6TV),
(6VX), (6WZ), (6XZ), 6ZB, (6ZN), (6ZU),
(6ZX), (6ZZ), (6AAK), (6AAH), (6AAW),
(6ACM), (6ADA), 6ABY, 6AEW, (6AFW),
6AGA, (6AGF), (6AID), 6AIN, (6AIW),
6ALA, (6ANK), (6APH), (6ARS), (6XAD),
(6ZAA), 7DA, 7IN, 7YA, 7ID, 7ZJ, 7IW.

**CALLS HEARD BY 7SG, DON HARRIS,
1711 SIMPSON AVE., ABERDEEN,
WASH., SEPT. 6 TO OCT. 1.**

Canadian—5BR 6AK 6AX 6CC 6CD 6CH
6CP 6CV 6DP 6DT 6EX 6GF 6GP 6GR 6GX
6HX 6IB 6IC 6KS 6LC 6LR 6OD 6OH 6OW
6PJ 6PP 6PR 6QR 6RH 6RX 6SU 6TC 6TU
6TV 6VM 6VX 6WO 6WZ 6ZE 6ZK 6ZU
6AAH 6AAU 6AAW 6ARM 6ABO 6ABR
6ABT 6ABW 6ABX 6ACA 6ACE 6ACR
6AEI 6AEW 6AEZ 6AFN 6AGF 6AHX
6AID 6ALU 6ANG 6APF 6ARC 6ARK 7BC
7BK 7BP 7CA 7CC 7CF 7CS 7ED 7FI 7GA
7ID 7IU 7IW 7IY 7JF 7KB 7GK 7KM 7LW
7MF 7MO 7OZ 7XD 7ZG 7ZJ 7ZM 7ZN 7ZP
7ZS 7ZT.

**CALLS HEARD BY 6LV, WILLIAM
BAKER, SAN MATEO, CALIF.**

6CX 6DP 6EA 6EB 6ED 6EN 6ER 6GC
6GF 6HK 6IC 6IS 6JC 6JD 6KA 6KC 6KP
6LC 6LX 6MH 6MV, OH 6OM 6PJ 6PP
6PR 6QR 6SK 6AAK 6ABW 6ACU 6AEI
6AGF 6AIE 6AIW 6AJE 6ALM 6ANK
6ANJ 6ANO 6ZA 6ZN 6ZH (phones and
C. W.) 6XAC 6XAJ 6ASJ 6ALE 6AVY
6AUL 6AWT 6AAT 6XG 6XC 6ZE 6XW
7ZM 7BK 7BY 7AD 7ZB 7ZJ 7ZT 7XD 7OZ
7IN 7IW 7IN 7BW 7ED 7YA 7YS.



PRICE

60¢

*Better—
Costs Less*

THERE must be good reasons
for its instant popularity—
why it was the hit of the
Chicago Radio Show—why today
it is the best seller.

It's the only socket made for both
base and panel mounting. It's made
in one piece, entirely of porcelain—
there is no metal shell—hence no
"ground hum." Its design elim-
inates possibility of short circuiting
filament across high voltage "B"
Battery. It is better—and costs only
60 cents. Be sure to use CROS-
LEY SOCKETS in the radio set you
are building. Every live dealer
handles them—if yours doesn't,
send us his name and order direct
—we will ship prepaid.

**DEALERS: It's worth your while
to investigate the CROSLEY line**

Crosley Manufacturing Company

RADIO DEPT. P.

CINCINNATI, OHIO

Phone San Jose 2126-J

Established 1909
1200 Students

OUR WAR RECORD—200 Men Trained—130 Placed in Service

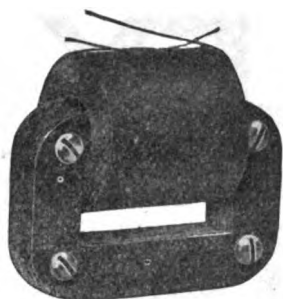
**HERROLD COLLEGE
OF ENGINEERING AND RADIO**

SPECIAL ATTENTION TO EXPERIMENTERS
AND AMATEURS

467 South First Street

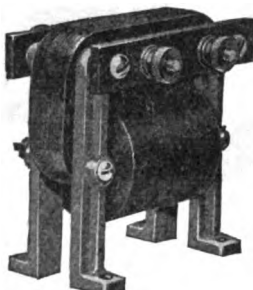
SAN JOSE, CALIF.

Say Radio to the Advertiser, it will help you.



Unmounted

ATLAS RADIO Products for Efficiency



Mounted

WHY YOU SHOULD BUY ATLAS RADIO PRODUCTS

Popular opinion has demanded that really efficient amplifying, modulation, filament heating and C W power transformers be put on the market and made available to the amateur. The great majority of these instruments on the market heretofore were highly inefficient, and have had a power factor in the neighborhood of 50%. ATLAS transformers will henceforth be rated on output, and will use double windings, larger windings, larger wire and larger cores in order that the power factor be as high as possible. This is being done at 100% increase in cost of production, but the selling price of the instruments will not be changed.

GUARANTEE: Run an efficiency test with any other transformer on the market and determine its power factor; then run the same test with Atlas transformers, and if they do not prove more efficient your money will be refunded upon request.

ATLAS AMPLIFYING TRANSFORMERS

Mounted	\$ 5.00
Semi - mounted	4.00
Unmounted	3.50

Parts for same—

Primary and secondary	2.50
Core	1.00
Four aluminum legs .....	.50
Panel and binding posts	1.00

ATLAS CW TRANSFORMERS

Plate Transformers, 500 Watt, 1000-1500 Volts

Mounted	\$24.00
Semi - mounted	22.00
Unmounted	19.00

Parts for same—

Complete windings	15.00
Core	4.00
Supporting legs	3.00
Panel and binding posts	2.00

ATLAS CW CHOKE COILS 1½

Henry 500 M.A.

Double semi-mounted	\$ 7.50
Single semi-mounted	5.50
Unmounted, double	6.00
Unmounted, single	4.00

Parts for same—

Coils, each	2.00
Core	2.00
Supporting legs	1.50

ATLAS CW POWER TRANSFORMERS

200 Watt, Secondary 350 and 550 Volts, Filament Winding 12 Volts Variable

Mounted	\$19.00
Semi - mounted	17.00
Unmounted	15.00

Parts for same—

Complete windings	12.00
Core	3.00
Supporting legs	2.00
Panel and binding posts	2.00

ATLAS FILAMENT HEATING TRANSFORMERS

75 Watt, Filament Voltage 8-10

Mounted	\$11.00
Semi - mounted	10.00
Unmounted	8.50

Parts for same—

Complete windings	5.00
Core	3.50
Supporting legs	1.50
Panel and binding posts	1.00

ATLAS CW POWER TRANSFORMERS

50 Watt, Secondary 375 Volts, Filament Winding, 10 V. Variable

Mounted	\$14.00
Semi - mounted	13.00
Unmounted	11.00

Parts for same—

Complete windings	9.00
-------------------------	------

Special sorted, tested and guaranteed Vacuum Tubes, all makes, at list prices.

Amateurs: Send 10 cents for Atlas Catalogue.

Dealers: Send for Catalogue and Discount Schedule.

The American Radio Sales & Service Co. MANSFIELD, OHIO
U. S. A.

Core	2.00
Supporting legs	2.00
Panel and binding posts	1.00

ATLAS CW TUNING INDUCTANCES

6 inch Formica Tubes No. 8

Enamelled Wire	
25 turn inductance	\$ 8.00
30 turn inductance	9.00
35 turn inductance	10.00

ATLAS MODULATION TRANSFORMERS

Mounted	\$ 5.00
Semi - mounted	4.00
Unmounted	3.50

Parts for same—

Primary and secondary	2.50
Core	1.00
Four supporting legs .....	.50
Panel and binding posts	1.00

ATLAS FILAMENT HEATING TRANSFORMERS

150 Watt Filament Voltage 10-12

Mounted	\$16.00
Semi - mounted	14.00
Unmounted	12.00

Parts for same—

Complete windings	8.00
Core	4.00
Supporting legs	2.00
Panel and binding posts	2.00

ATLAS CW CHOKE COILS

1½ Henry 150 M.A.

Double, semi-mounted	\$ 5.50
Single, semi-mounted	4.00
Double, unmounted	4.50
Single, unmounted	3.00

Parts for same—

Coils, each	1.50
Core	1.50
Supporting legs	1.00

ATLAS RECEIVING AND POWER TUBE RHEOSTATS

6 ohm 1.5 ampere for receiving tubes

6 ohm 7 ampere for 5 to 50 watt power tubes	\$ 1.00
4 ohm 16 ampere for 50 to 250 watt power tubes	2.00
4 ohm 16 ampere for 50 to 250 watt power tubes	5.00

ATLAS SPECIAL RHEOSTATS FOR CONSTANT VOLTAGE CONTROL OF POWER TUBES

50 ohm 3 ampere at 110 volts for primary control of 5 watt power tubes

50 ohm 7 ampere at 110 volts for primary control of 50 watt power tubes	\$ 5.00
50 ohm 15 ampere at 110 volts for primary control of 250 watt power tubes	10.00
50 ohm 15 ampere at 110 volts for primary control of 250 watt power tubes	15.00

Prices quoted on other sizes on request.

ATLAS DX-52 SUPER OSCILLATION TRANSFORMER, \$25.00

C. W. NEWSLETTS

(Concluded from Page 171)

New members of the C. W. Club of California include 7RV, W. Morton, 6523 45th avenue, S. E., Portland, Ore., whose schedule is 11:10 p. m. Tuesday, Thursday and Saturday; 6AQT, M. Graham, 6784 Hollywood boulevard, Hollywood, Calif., wave length 202 meters, schedule 11:10 p. m. Monday, Wednesday and Friday, and 6ZAF, Allen H. Babcock, 2227 Piedmont avenue, Berkeley, Calif., wave length 375 meters, schedule not yet assigned.

Plans are in mind to enlarge the C. W. Club of California to the C. W. Club of America, due to requests from district C. W. workers, the increasing range of C. W. work and the greater scope of Radio. What think you Eastern men of the idea? Definite announcement will be made in an early issue.

Radio 6XN asks that his wave length be listed at 240.

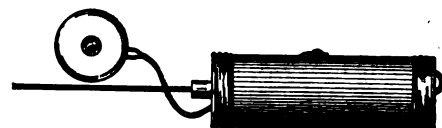
SKINDERVIKEN TRANSMITTER BUTTON



plete instructions for use, \$1.00.

This famous button made in several styles for experimenters and wireless men. Super-sensitive style for detectaphone work. Sends piano, violin and victrola music thruout the house. Common battery style for wireless telephone and amplifier use. Capable of passing a greater amperage than most transmitters. Price with complete instructions for use, \$1.00.

The Wonderful Mechanical Stethoscope

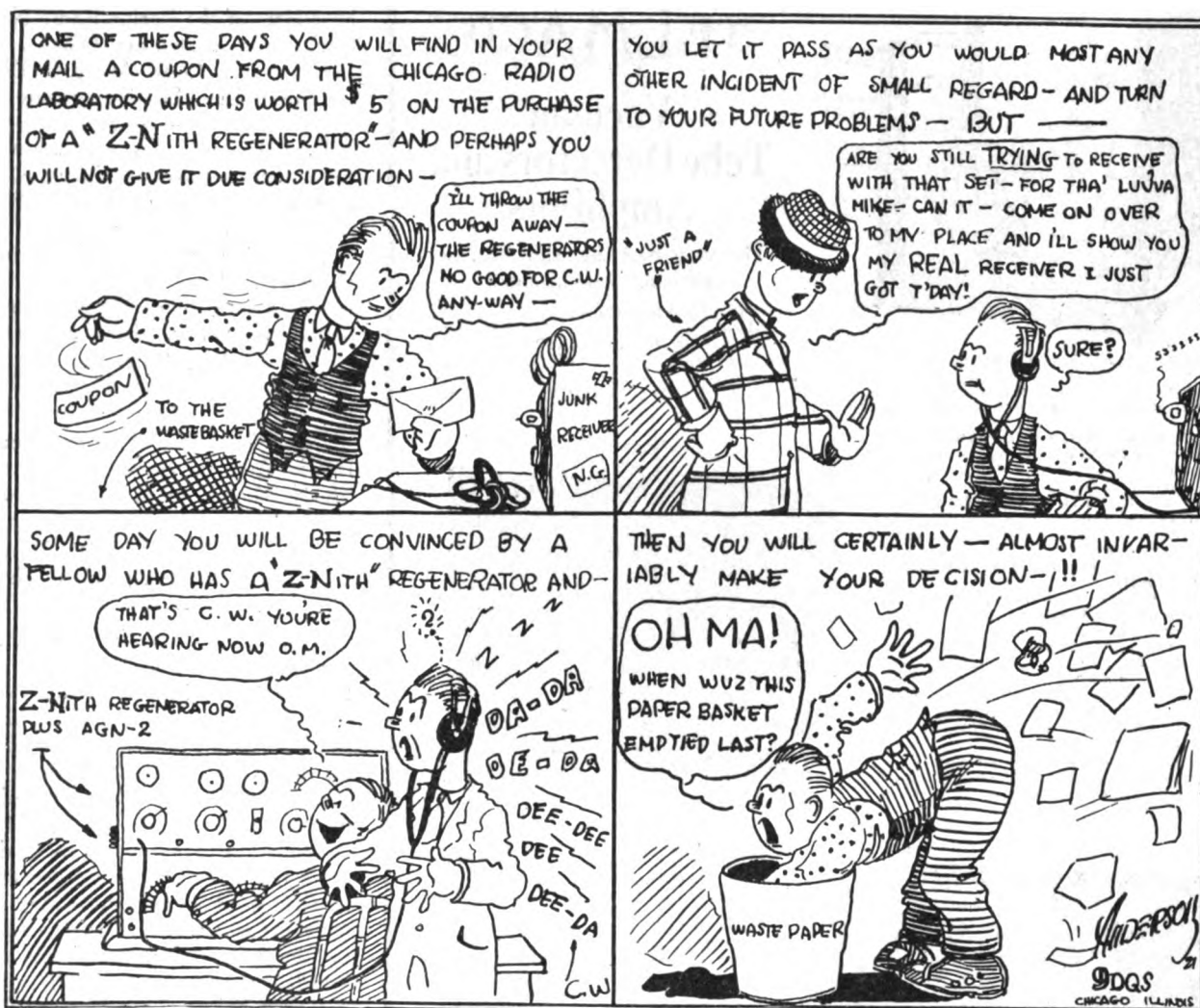


enables you to detect instantly any knock, loose parts or other trouble in auto engines which causes destruction and heavy expense, unless attended to at once. Auto Mechanics everywhere depend upon the Stethoscope for *inside information*. The mechanical Stethoscope with authoritative Sound Chart offered to you on a money-back guarantee for only \$7.50 by mail, postpaid. Send for literature and letters of approval without obligation.

EXPERT TESTIMONY

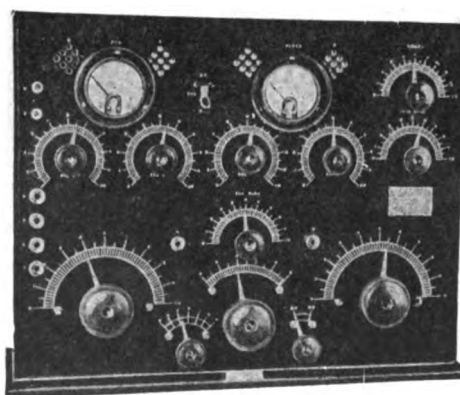
"IN my 18 years of using broom handles, screw drivers and other handy things to locate sounds with. I have never had anything that could beat the Stethoscope. If I could not get another, \$100.00 would not buy mine." (From an automobile expert, name on request)

General Sound Transmission Corporation
114 LIBERTY ST., NEW YORK.
Dealers and Agents Wanted. Write for Literature.



QRX Fellows—Here's Your Chance to Save Five Dollars on a Real C. W. Receiver

**BEST for
SPARK**



Z-Nith Regenerator

To be useful in a modern radio station, a receiver must be equally satisfactory for the reception of spark and C. W. signals. A set designed to respond to either alone does not meet the needs of an up-to-date DX traffic station.

The new, improved Z-Nith Regenerator, with a range of 180-1000 meters, 180 coupling, variometers with balanced inductance and many other exclusive features, will

enable you to handle traffic with spark, C. W. and radiofane stations at will. In order to boom fall business, we are sending, without charge, a coupon, good for \$5.00 on the purchase of one of these wonderful new Regenerators to every person on our mailing list. If we don't have your name, and you want to take advantage of this unprecedented offer—

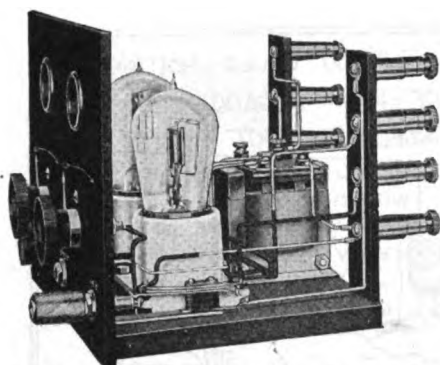
**BEST for
C. W.**

Write Us Now!

Chicago Radio Laboratory

6433 Ravenswood Avenue, Chicago, Illinois

Say Radio to the Advertiser, it will help you.



TELMACO

Vacuum Tube Detectors and Amplifiers

The very best that skill and experience can produce

THE CABINETS are constructed of selected quarter sawed oak; stained inside and out; waxed and finished. They are attached to drawer shelf, permitting complete assembly to be instantly removed and used without cabinet, if desired. FILAMENT CONTROL RHEOSTATS are of approved type.

TELMACO SPECIAL BINDING POST CONSTRUCTION, is used throughout, entirely eliminating all wiring from the front of the panel. AMPLIFYING TRANSFORMERS are of new type, designed to operate with maximum efficiency with the new type tubes. We furnish them FULLY MOUNTED.

The GRID CONDENSER and VARIABLE LEAK are wired in the detector circuit, the latter on the front of panel. SOCKETS are of high grade construction to fit tubes having standard four prong bases. LETTERING on panel is pantograph machine engraved and filled with best grade of white enamel.

FULL AUTOMATIC CONTROL JACKS are wired into these amplifiers. RADIO PLUG is furnished with the above.



PRICES

Type TD-1, Telmaco Vacuum Tube Detector Unit	\$15.00
Type TDA-1 Telmaco Detector and Single Stage Amplifier Unit	35.00
Type TA-2 Telmaco Two-Stage Amplifier	40.00
Type TDA-2 Telmaco Detector and Two-Stage Amplifier	45.00

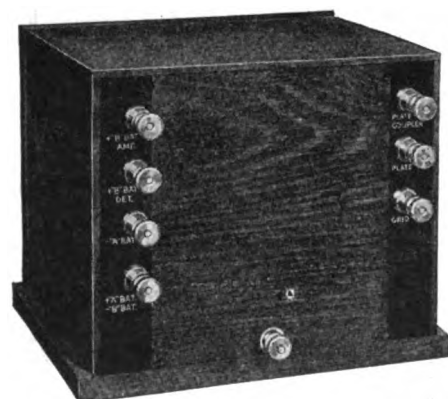
Order Direct From This Ad

Satisfaction guaranteed always or money refunded. Send for our complete new catalog, "P." You'll find it interesting; it describes everything in Radio.

Your panels engraved with our GORTON ENGRAVER. Price, 5 cents per letter. Minimum charge, \$2.00.

Radio Division

Telephone Maintenance Co.
17 N. La Salle St., Chicago, Ill.



DEALERS! We are distributors for nearly all Standard Lines. Write for our Special Proposition.

LETTERS TO THE EDITOR

Dear Sir: Will you kindly state in the next issue of the Pacific Radio News that 6GR is now located at: 6GR—.

EDW. ANDERSON,

1420 26th St., Sacramento, Calif.

Dear Editor: I would appreciate it very much to have my change of address placed in your magazine: "6AQU has moved his station from 117 West 45th St., Los Angeles, to 1937 Haste St., Berkeley." Have been reading the P. R. N. for a long time and it keeps getting better and better. Best magazine yet.

Very truly,

H. BECKER.

Dear Sirs: In looking over your Sixth District Amateur Stations I find you have 6ATN, M. E. Stuart, which should read M. E. Smart. Kindly rectify the error.

MERLE EDISON SMART,

Motor Route A, Fallon, Nevada.

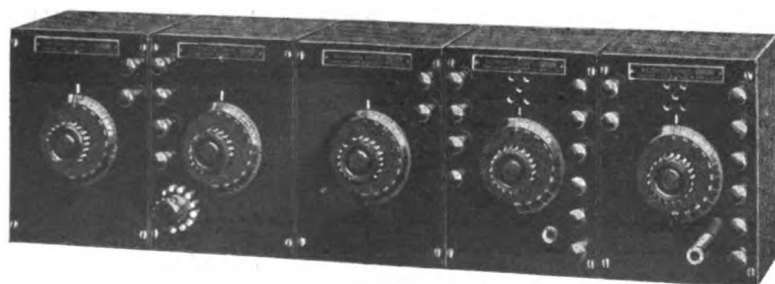
Dear Sir: I note in your October issue of Pacific Radio News there is an article written by Mr. Schuwendt describing the construction of a small C. W. Radio set, wherein he writes, "from which can be seen that the circuit used is the familiar Colpitts with grid method of modulation."

While the writer does not claim very great results, when this method of modulation is used, he most certainly objects to have the entire credit go to someone who did not first produce the circuit as drawn by Mr. Schuwendt on page 87.

If Mr. Schuwendt will carefully analyze Mr. Colpitt's circuit and then compare it with Logwood's circuit, he will note a similarity in grid modulation, but will not see much resemblance in the rest of the two circuits.

In the first place, Mr. Colpitt's circuit is an inductive feed back arrangement, while the Logwood circuit is a capacity coupled. In Mr. Colpitt's circuit he makes use of a C battery in the grid circuit, while in the Logwood circuit the grid leak is in series with the secondary of the

Service Radio Equipment



Service Unit Receiver

SERVICE equipment fills the needs of every Amateur. Built into each instrument is the care and precision that will insure perfect operation and long life. And to back this statement is a guarantee that absolutely protects the purchaser.

Send for our bulletin now and let your next order be for SERVICE EQUIPMENT. Register on our mailing list and keep informed of the latest in radio development.

We have three ideals—

The first is SERVICE—so are the other TWO

SERVICE RADIO EQUIPMENT

Box 340 Central Sta.

Toledo, Ohio

Say Radio to the Advertiser, it will help you.

modulation transformer. Further inspection of the two circuits the H. F. oscillations are fed to the antenna through an oscillation transformer in the Colpitt circuit, while it is connected directly to the antenna in the Logwood circuit.

It was the idea of the writer to produce a circuit that did away with the well known four tuned circuit and be free from patent interference. To do this meant a single open radiating circuit, and the simplicity of the circuit devised by the writer is drawn out by Mr. Heising in the I. R. E. Proc., August, 1921. On pages 319 and 320 there is drawn the two circuits which are subject matter in this letter.

In a short time another patent will be issued to the writer which will show the filament earth connection erroneously left out in the patent already issued, which makes this circuit possible to oscillate efficiently. Very respectfully,

C. V. LOGWOOD,

Radio Engineer for the City of Chicago.

CUTTHROAT COMPETITION IN GENERAL PUBLIC BUSINESS

(Concluded from Page 174)

Special Extra Rush, San Francisco, Calif. Radio, Unga, Alaska:

During first two months of general public operation you handled 18,113 words of Bolshevik code correspondence. In accepting messages from a foreign radio station we become responsible for all forwarding charges that arise after we pass the traffic through our station. On this code the forwarding charges from Unga to Washington, D. C., totals thirty-six cents a word, to which we added our own six-cent tariff, and sent a bill for \$7607.46 to the Russian government. They wrote us a letter thanking us for handling their messages and enclosed a remittance of 14,916 rubles, which we have just sold as old paper for nine cents. Conferring with Great Alaskan Fisheries, we find our deficit account public operation of K-V-I will be about \$8100.00 greater than theirs. They probably have a much more intelligent operator than we, at any rate we are convinced we got enough of this public business stuff.

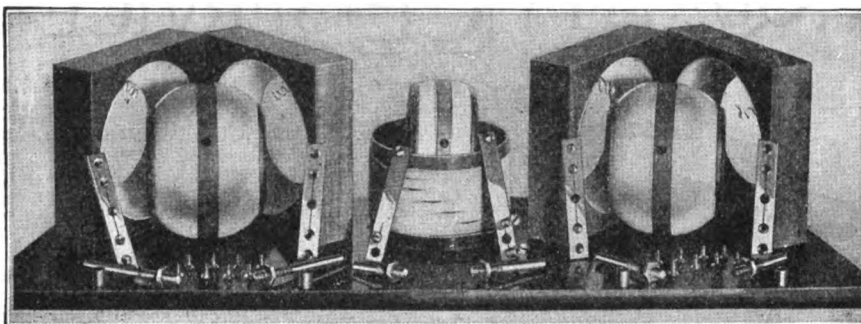
Your station has been returned to a limited commercial license. Do not accept any outside business from anybody under any circumstances or you will be immediately discharged. Alaskan Codfish Company.

Night Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Ship immediately one thousand pounds each prunes and raisins, two tons each best quality barley and rye. Present stock completely exhausted account preparations for great peace celebration of Unga and Pirate Cove settlements. Also ship one hundred latest magazines for radio operator. Ed Hooley, Supt.

FAMOUS "CHI-RAD" K. D. VARIOMETER PARTS



All parts to build two variometers and one coupler. ALL WINDINGS IN PLACE—nothing to do but screw on bearings and connect up. Complete set can be assembled in 30 minutes. The biggest value on the market—order a set today. Immediate Delivery.

Price, complete as shown, \$10.00. Add PP on 6 lbs.

SPECIFICATIONS

Variometer forms 4 1/4 in. Sq., 3 in. wide when assembled. Coupler primary Bakelite 3 1/2 in. diam., 3 1/2 in. high. All shafts 1/4 in. diameter. 7 Primary Taps.

Range 150-475 meters. Special condenser to shunt secondary and increase range to 650 meters supplied for 35c extra.

Made specially for panel mounting—all screws covered by dials when assembled.

Immediate Delivery—Money Back Guarantee.

CAUTION

Due to the great popularity of "Chi-Rad" Variometer Parts they are being imitated. For your protection our name appears on every instrument. Accept no substitutes—insist on "Chi-Rad." Solid Mahogany Variometer Parts. Your dealer will get them for you.

Dealers: Write for discounts on these Variometer parts. They will move fast and make you a handsome profit. We

are also jobbing all standard lines of Radio Apparatus. Why not buy all your Radio material from one, old reliable house and get full dealer's discount, plus "Immediate Delivery" from Chicago stock? Write for full information.

Chicago Amateurs: Come and inspect our new stock—largest and most complete in the Middle West.

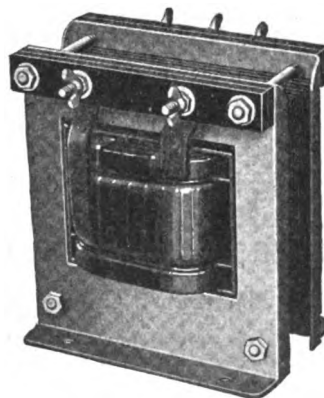
CHICAGO RADIO APPARATUS CO., Inc.

Phone: Harrison 1716

508 South Dearborn Street

CHICAGO, ILL.

Shell Type Filament Transformers for C.W.



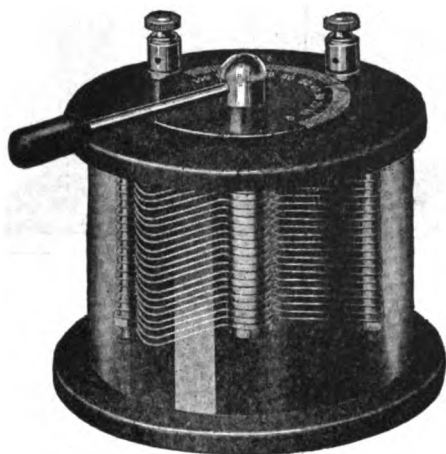
10 VOLT SEC., TAPPED AT CENTRE

1 or 2—50 Watt Tubes, Mounted.....	\$10.00
1 or 2—50 Watt Tubes, Unmounted.....	8.00
4 —50 Watt Tubes, Mounted.....	15.00
4 —50 Watt Tubes, Unmounted.....	12.00

Thordarson Electric Mfg. Co.

513 S. Jefferson Street, Chicago, Ill.

QUALITY **CE** SERVICE



We don't say that C. E. apparatus is the only good radio equipment you can buy. But we do say that every piece of equipment in the C. E. line is made not just to sell but to serve.

For instance, when you buy this C. E. 43-Plate Rotary Variable Condenser for \$4.75 you know, of course, that you are not paying a high price for an instrument of this class. But you can be sure—because it is a C. E. product—that you are getting an instrument that will give you many times your money's worth in real satisfactory service. Note these quality features:

C. E. Rotary Variable Condenser.
43-Plate, \$4.75.
43-Plate, Unmounted, \$4.25.
17-Plate, \$4.25.
17-Plate, Unmounted, \$3.25.

Aluminum plates accurately punched with hardened dies—far superior to condensers with trouble making plates containing iron and steel. Both rotary and stationary plates are spaced with separators machined to an accuracy of one two-thousandth of an inch. The rotary plates are carried on a shaft made of finest tool steel mounted in a long, accurately machined brass bearing, insuring permanently accurate adjustment and long life. The entire Condenser is enclosed in a cylinder of the clearest and toughest flint glass and has a pressed metal base and a top of specially moulded insulating material highly polished. Readings are indicated on a black rotary dial with extension handle and sunken silver numerals and scale. Made in two sizes, respectively, equipped with 43 and 17 plates. The capacity of the 43-Plate Condenser approximately .0008 M. F. and of the 17-Plate Condenser approximately .0003 M. F. The fine workmanship and superior materials put into this C. E. Condenser are apparent in its handsome appearance and efficient service. Yet it costs no more than many inferior condensers.

C. E. Amplifier Coll. Type Q. O.
Mounted, \$6.50.
Unmounted, \$4.00.

We have never departed from our high standard to meet a price and will continue to supply our condensers, as in the past, with accurately machined individual separators, aluminum plates and all the other quality features which distinguish them. Lower manufacturing costs, however, enable us to offer this C. E. Rotary Variable Condenser at the new low prices quoted below.

Then there is this C. E. Type Q. O. Amplifier Coll.—a thoroughly practical, high grade audio frequency, iron core transformer capable of increasing the strength of signals to many times their original intensity. Specially designed for use with vacuum tube detectors. By using two or more of these colls, with as many amplifying tubes, a multi-stage amplifier may be made, securing still greater amplification. Supplied mounted, with panel, as illustrated, or unmounted complete with feet but without panel.

Send 6 cents for the C. E. Catalog showing our full line of radio equipment—Hytone Transmitting Sets, Oscillation Transformer, Regenerative Receiving Sets, Radio Telephone Receiving Sets, Two Stage Amplifier, Wavemeters, Tesla Coils, Spark Dischargers, Keys, Instruments, etc., etc.

CLAPP-EASTHAM COMPANY

RADIO ENGINEERS and MANUFACTURERS

140 Main Street, Cambridge, Mass.

California Representative: LEO J. MEYBERG CO.
San Francisco and Los Angeles

Do You Need a Vacuum Tube?

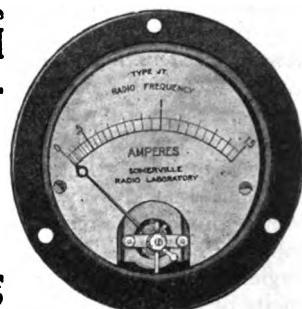
We will send you one free of charge if you secure 3 yearly subscriptions to "RADIO." You can have your choice of any standard receiving tube. Send \$6.00, the 3 subscriptions, and 25 cents for mailing the tube.

RADIO, 465 Pacific Building, San Francisco, Calif.

Know the
TRUTH
Use a
TYPE JT

Thermo-
Junction
Radiation
Ammeter
0-1½, 0-3
0-5, 0-10
Amp.
Ranges

\$12 POST PAID



Generous size—3½ in. diam. Extremely accurate and rugged movement. Jewelled bearings. Supersensitive Thermo-Couple. No zero adjustment necessary.

Double the life of your UV 202 by using our now famous Type JX 0-15 A. C. Voltmeter. Jewelled bearings. Magnetic vane movement. Matches the TYPE JT 3½-in. diam.

(Also available) (in 0-10 Amperes), \$8.00 Postpaid.

Somerville Radio Laboratory

New Address 178 Washington Street
BOSTON, MASS.

THE PRESIDIO STATION

(Continued from Page 144)

sponsible for these improvements are well known to the radio fraternity.

In conclusion I might give a description of our set and antenna system. The antenna system is composed of a "T" type antenna 80 feet long, 4 wires spaced 3 feet apart; both ends open and insulated from the spreader. This is by no means ideal and we expect to make some slight changes in the near future. The lead-in is 65 feet long and is rat-tailed down to the lead-in insulator. The counterpoise system is composed of 16 wires spaced 1 foot apart, placed directly under the antenna and raised 3 feet off the ground, and is well insulated from ground. The set used is a plain two-tube transmitter, using one as an oscillator in a Colpitt circuit and the other as a modulator in the Heising circuit, the tubes being the Western Electric VT-2. The two transmitting tube filaments draw 3 amperes and operates on a plate current of 90 to 110 milliamperes, and the normal radiation is .8 ampere. The power supply of the set is a 28-watt dynamotor, Westinghouse make, the motor side of which is run by a 12-volt storage battery, this same storage battery operates the send-receive relay, the microphone and lights the filaments of both transmitting and receiving tubes. The generator side of the dynamotor furnishes the plate potential, about 350 to 450 volts.

PACIFIC RADIO TRADE ASSOCIATION

Organization of the Pacific Radio Trade Association has been accomplished at San Francisco and Los Angeles, with A. H. Halloran as president, Ellery B. Stone as vice president, representing Northern California and Nevada; A. J. Edgcomb as vice president representing Southern California and Arizona; Max



**SPECIAL OFFER
SEIBT PHONES**

Unequaled opportunity. Special purchase cut price to unheard-of figure. We pass the savings on to you. World famous Seibt Phones—the invention of Dr. Seibt, builder of Seibt Precision Instruments—were \$12.75.

\$7.75
Equipped with Firco No. 34B, round type, "Bull - Dog - Grip" Plug, for only **\$9.25**

Nearest Firco dealer can supply you.

Wouldn't You Like to Own this Station?

TUNER, detector and 6-step amplifier for \$115.00! Real quality at a new low price level—so arranged that you can invest a little at a time and yet get results right from the start.

That's what you get in Firco Midget Sets. You can start with just the Firco Tuner (150 to 1000 meters) for \$15.00 and the Firco Detector for \$11.00. You'll get results at once, better than you ever expected. Then you can add a little at a time till you get a powerful station like the one shown here.

Or, hook Firco Midget Audion Sets on to your present receiving apparatus. But to preserve neat appearance and insure smooth operation, use Firco Audion Sets thruout. Then you're sure of results, because they're made to work together.

Read the price list below. Go to your radio dealer and let the sets speak of their quality for themselves. Then resolve to put every cent you invest in radio from now on into Firco apparatus—where you get the most for your money.

Note: Six steps of amplification are made entirely practical, without howling or squealing, by the use of Firco Saco-Clad transformers. Saco-Clad 100% shielded amplifying transformers are also sold separately, in individual cartons, for \$5.00.

Hook a Vocaloud onto any amplifying combination of Firco Sets, or other apparatus, and get your sig-

nals QSA all over your house. No batteries, no adjustments, no extras. Station type (shown above) in solid mahogany cabinets, **\$30.00.**

Pick up the weak signals with Seibt or Brown phones, also sold by Firco dealers under the Firco trademark. At the new low prices, Brown super-sensitive, imported Phones are an unheard-of bargain.



**FIRCO MIDGET
RADIO SETS**

Tuner, 35A...	\$15.00
Detector, 36A..	11.00
Detector and One-step Am- plifier, 37A..	24.00
Detector and Two-step Amplifier, 38A	40.00
One-step Am- plifier, 39A..	18.00
Two-Step Am- plifier, 40A..	30.00

BROWN PHONES

Type A, Adjust- able; was \$22.00, now..	\$18.00
Type D, for Radio work; was \$20.00, now	16.00

John Firth & Company, Inc., 18 Broadway, New York

FIRCO RADIO

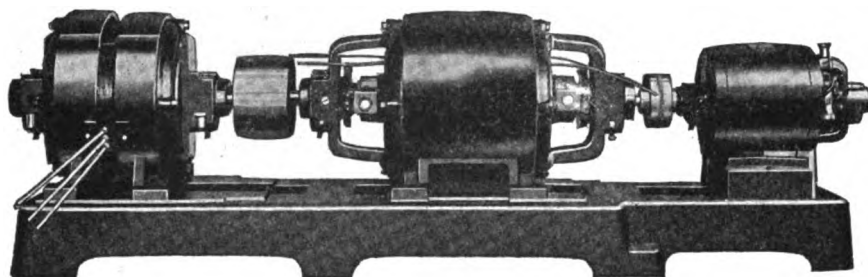
MIDGET RECEIVING SETS

"Pioneers—since 1901"

Say Radio to the Advertiser, it will help you.

TRADE **ESCO** MARK

GENERATORS—MOTOR-GENERATORS—DYNAMOTORS



4 to 32 Volts for Filament—350 to 2000 Volts for Plate.
Capacity 20 to 2000 Watts—Liberal Ratings.
Write for Bulletin 237, which lists over 200 Combinations.

**MOTORS AND GENERATORS DEVELOPED
FOR SPECIAL PURPOSES**

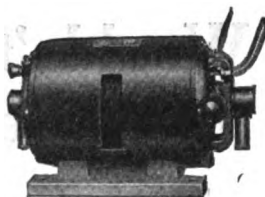
PIONEERS IN MANUFACTURING

High Voltage Direct Current Radio Generators

Electric Specialty Co.

STAMFORD, CONN., U. S. A.

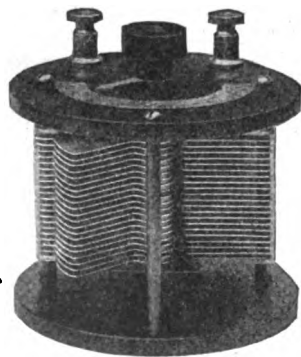
217 South Street



"ILLINOIS" THE RELIABLE MADE RIGHT - STAYS RIGHT



STYLE No. 1.

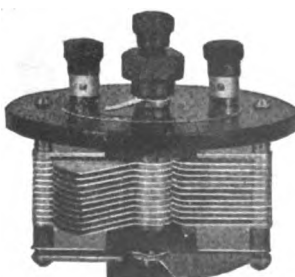


STYLE No. 2.

Three Styles: No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profitteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



VERNIER

Options:—With Style No. 1—Instead of Scale and Pointer, a 3. inch Metal Dial at 50 cents extra, or a 3. inch Bakelite Dial at \$1.00 extra. Large Knobs. Both excellent values. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave.

Springfield, Illinois

Loewenthal as secretary treasurer; Hall Berringer as secretary at Los Angeles, and E. T. Cunningham, Colin B. Kennedy and A. F. Pendleton as directors. Enthusiastic and well attended meetings have been held at both Los Angeles and San Francisco, constitution and by-laws adopted and committees appointed.

The District I committees are as follows:

Program Committee

D. E. Lyon, chairman; E. Portal, J. F. Dillon, L. Ets-Hoskin, C. B. Nelson.

Membership Committee

H. C. Hopkins, chairman; H. W. Dickow, S. Warner, C. Hassler, Tom Lambert, San Jose.

Public Policy Committee

Louis Levy, chairman; S. N. Peterson, O. H. Chamberlin, A. F. Pendleton, E. T. Cunningham.

Merchandising Committee

Leo J. Meyberg, chairman; H. J. Rathbun, J. K. Fairchild, L. H. Waldron, N. R. Kuhn.

Educational Committee

O. H. Miller, chairman; H. C. Hopkins, J. L. Swindelle, B. F. MacNamee, N. A. Bowers.

Make Your Tubes "Burnout" Proof

This tiny fuse, slipped directly on filament terminals of any standard bulb, protects your tube against burning out.

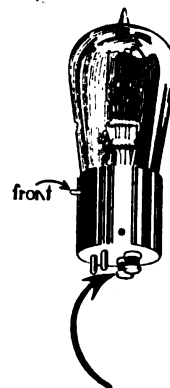
RADECO SAFETY FUSE (Patent pending)

NOW, while your tube is in perfect condition, slip one dollar to this advertisement and be guarded against all future vacuum tube expense.

RADECO Safety Fuses come in ¼, 1, 1½, 2, 2½ and 3 amp. sizes. Slip directly on filament terminals of any standard bulb. Used in any standard socket. **FOUR FOR \$1.00**

We carry complete stock of all radio apparatus. Order from any Standard catalog.

MAIL ORDERS
Be sure and specify the size or sizes when ordering by mail.



Radio Equipment Co.

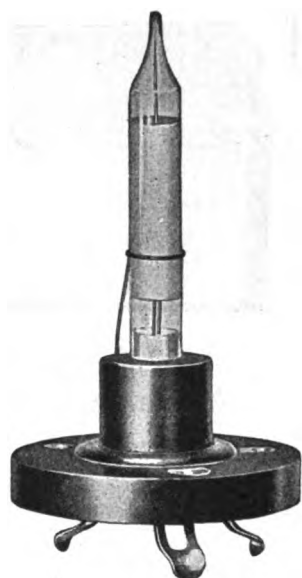
630 WASHINGTON STREET,
Boston, Mass.

CONNECTICUT RADIO

The New Electron Tube

Detector and Self Amplifier

(Fully protected by patents in the principal countries throughout the world)



This Tube, the Sensation of the Chicago Radio Show, is new in principle and in operation. Hence it offers these notable advantages:

No B Batteries
No Tickler
No Grid Leaks
No Filament Adjustment
High Selectivity
Extreme Sensitiveness
(Equal to one stage of amplification)

Much Longer Life
Uniformity of Tubes
(All equally good)

It represents the result of over four years' exhaustive research, the study of nearly 2000 tubes, with complete records of the characteristics of each one. It has had thorough tests in our own research laboratories, and months of continuous operating use.

Only after gaining this full knowledge of its characteristics, its remarkable possibilities, and its practical usefulness, are we ready to offer it to radio workers as a forward step in a great field.

Made up in the complete CONNECTICUT Detector Set at \$35.00; Detector Unit alone, \$12.00; Tubes (for replacement), \$3.50.

We shall be glad to furnish you with further information on request. Or ask your dealer to show you the set.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Connecticut

80 Britannia Street

Say Radio to the Advertiser, it will help you.

Dealers and Amateurs Have You Our Proposition?

What is more unpleasant and aggravating than an ill-fitting Battery? Make up your mind once and for all, you will have a battery that will satisfy you and your followers, a battery that does not corrode before the time expires, a battery that has proven to outlast any other make on market. Make up your mind that this time you will buy a battery that follows the lines of your outfit, that from the very day you connect your wires to the battery it will increase your service and stand up to its test.

SAB-IS-CO batteries combines the three features that you have been looking for—Battery, Guarantee and Price. Our variable battery observe so closely the posts that economize and give you the full value for the money.

For the SAB-IS-CO battery, whether variable or plain, large or small, are made of the very best and highest grade material that science can produce. Select your styles and order them by number, as follows:

No. 923 Small, plain	\$1.25 each
No. 923 Small, variable	2.00 each
No. 925 Large, variable	3.50 each
No. 925 Large, plain	2.10 each

Dealers, have you our proposition?—Send for your discounts.

Amateurs, if you cannot obtain a SAB-IS-CO battery from your dealer, write direct to us for your discounts, and we will send you free of parcel post charge. Your money will be refunded if found not satisfactory. Mention your dealer's name when ordering.

Watch for our advertisement in the November issue

J. H. SABINSKY & CO.

640 Broadway

New York City

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls, from .005" to .020" thick.

Let us show how our standard products can be made to solve your insulation problems. Pacific Coast dealers carry a full stock of Bakelite-Dilecto, Vulcanized Fibre, Continental-Bakelite and Conite.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

DUCOMMUN HARDWARE CO., 219 Central Ave., Los Angeles, Cal.

CALIFORNIA ELECTRIC SUPPLY CO., 643 Mission St., San Francisco

233 Broadway, New York City

525 Market St., San Francisco, Cal.

301 Fifth Ave., Pittsburgh, Pa.

332 S. Michigan Ave., Chicago, Ill.

411 S. Main St., Los Angeles, Cal.

89 Wellington St. W., Toronto, Ont., Canada.

—Standard, up-to-the-minute RADIO Material—COMPLETE Line

Write for Our Price List

Regenerative Sets,
Audion Bulbs for every purpose,
Special Antenna Wire,
Insulators, Dials, Variometers,
Condensers of every kind,
Radio Magnavox, Amplifiers and Parts.

1014 Sixth



Sacramento

STATIC STATISTICS

(Continued from Page 150)

cert every night. The Northwestern Radio Manufacturing Company (7XF) is giving us the latest jazz every night from 8 to 8:30 p. m. The records are furnished by the Remic Song Shop of this city, which makes it possible for the latest to be available at all times.

As 7ZB had just returned from a trip to Tacoma and Seattle you no doubt will understand that he was all filled up on theory and had to inform 7ZT and 7ED of some of his findings and conclusions arrived at through 15 minutes of scientific study and consultation with 7BK.

BANG

Smashing "B" Battery Prices
"WIZARD"



From Manufacturer to User All Batteries Sent Postpaid

Announcing:

Wizard's 2 new improved type "B" Batteries

No. 1632, 1 Tap, 45 Volt Variable Battery.
Size 6 in. x 5 in. x 2-38 in.
Price \$2.80. Weight 3 1/2 lbs.

No. 1630, 6 Taps, 27 Volt Variable Battery.
Size 6 x 3 x 2-38 in.
Price \$1.80. Weight 2 1/2 lbs.

These new types are not made of the same size cells as a small size "B" Battery. The volume of a cell used in these types is 4.7 cubic inches, as compared with 2.5 cubic inches, the volume of a cell used in the small "B's".

You can easily see that the life of these two types are almost double the life of the small "B's".

No. 1632 has one tap at 22 1/2 volts.

These prices seem unbelievable, as do all other "WIZARD" prices, but are made possible only by dealing direct with the consumer.

Thousands are realizing the money that can be saved in the course of one year by purchasing from "WIZARD." Always remember we pay all P. P. charges. Write for Bulletin No. 6. Other "WIZARD" types:

Cat. No.	Size.	Taps.	Age.	Wt. lb.	Price
1623 Plain	3 3/4 x 2 1/4 x 2	5	22 1/2	1	\$1.00
1623 Variable	3 3/4 x 2 1/4 x 2	5	22 1/2	1	1.20
1625 Plain	6 3/4 x 4 x 3	5	22 1/2	5	1.85
1625 Variable	6 3/4 x 4 x 3	5	22 1/2	5	2.25
1626 Plain	6 3/4 x 8 x 3	45	10	3.75	
1626 Variable	6 3/4 x 8 x 3	45	10	4.15	

Send all money orders to

Wizard Battery Co.

1315 42nd St. Brooklyn, N. Y.

Dept. R

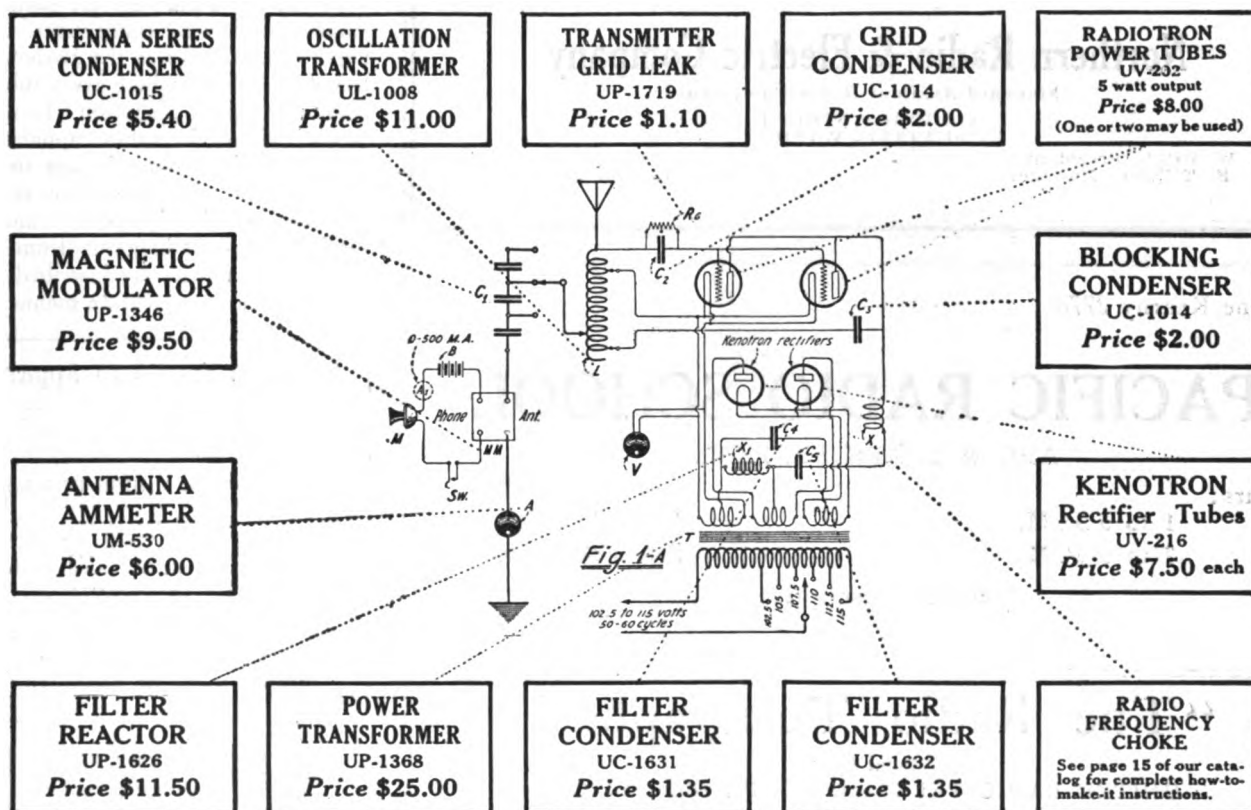
A DEPENDABLE RADIO TELEPHONE

For the Amateur

Here is the Complete Circuit—it Works—

Look over our New Catalog, Select the Necessary Apparatus and Order it from your Nearest Dealer

Radiotron Transmission combined with Kenotron Rectification and Magnetic Modulation constitutes the ideal amateur set



The above circuit diagram is but one of many appearing in our new Catalog where the necessary apparatus for each circuit is clearly and accurately described. By following the advice given therein and purchasing the lead-

ing items listed, the amateur is assured of the maximum efficiency at a minimum of power consumption. And remember, that the new Magnetic Modulator makes the operation of a radio telephone set exceedingly simple.

If you live in the United States and have not already secured your copy of our combined instruction book and catalog, send 25 cents today to

SALES DIVISION, Suite 1804

Radio  **Corporation**
of America
233 BROADWAY—NEW YORK CITY

Service from Seattle

**INTELLIGENT - SPEEDY
RELIABLE**

Our stock includes practically everything the experimenter and amateur could need.

Our prices eliminate the necessity of buying elsewhere.

Our technical department still maintains its free consulting service. Write us when in need of information on anything connected with radio.

Send for our "Right-Price" List.

Northern Radio & Electric Company

Standard Amateur Radio Equipment

418 UNION STREET
SEATTLE, WASH.

R. W. BELL, President
H. S. TENNY, Manager

Telephone Elliott 0152
Radio Call 7FW

Phone Kearny 2778

PACIFIC RADIO SCHOOL

ARC & SPARK SYSTEMS

Hours:

1 to 5 P. M.

7 to 9 P. M.

433 Call Bldg.,

San Francisco, Cal.

Send for descriptive circular.

"The Radio Telegrapher"

Official Organ
UNITED RADIO TELEGRAPHERS' ASSOCIATION
Room 303
44 Broad Street

Read about what's going on among the Commercial, Navy and Army operators

ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 Yearly, 15 Cents a Copy



—RADIO INSTITUTE— OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA
Phone Douglas 3030 331 New Call Bldg., San Francisco

THE NEW YORK ELECTRICAL SHOW AND THE PART PLAYED BY RADIO

At the New York Electrical Show, from September 28 to October 8, the Radio Corporation of America was one of the most important exhibitors, with exhibits of transoceanic radio communication, marine radio communication and radio sales. One of the features of the exhibit was a 100-watt, C.W. and radio telephone, self-rectifying set, employing Kenotron rectifier tubes and the new magnetic modulator placed on an operating table in such a manner that every piece of apparatus was clearly shown and connected by colored wires. A 10-20 watt C.W. and phone set, using D.C. on plate, was also in operating order on this table with the same unique manner of showing connections. Another important exhibit was the Radiotron and Kenotron exhibit, where every tube in the Radiotron and Kenotron family was shown. Other important apparatus was a Klineschmidt automatic tape perforator and tape recorder as used by the Radio Corporation in its high power transoceanic services when radiograms from Europe and other countries are inscribed on tape in a correct and accurate manner.

Assemble Your Own Apparatus

We are now manufacturing Radio Apparatus of improved designs, and furnish stock parts for those who desire to build their own cabinets. These prices can not be beat.

COMPARE THESE PRICES

Triple Honeycomb Mounting (for panel mounting)	\$5.00
Variometer wood parts (unassembled and unmounted)	2.00
Miniature D. P. D. T. panel Switch	1.00
Vario-coupler Rotor .....	.60

"Paragon" equipment is not merely assembled - - - but BUILT.

Send 10 cents for Bulletin and future announcements.

PARAGON ELECTRIC CO.,

215 North 6th Street, H.

Newark, New Jersey



AMATEURS EVERYWHERE

are reading this national radio journal.

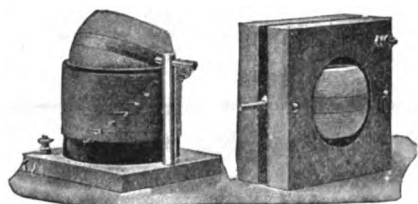
It is interesting and different. Each copy is worth the price of a year's subscription—One Dollar. Write today for Sample Copy

RADIO TOPICS
4533 N. Sawyer Ave., Chicago, Ill.

PLAN TO CONTROL WORLD'S WIRELESS

An international wireless company for the control and development of the greater part of the world's radio facilities has been organized at Paris by representatives of the wireless interests of Great Britain, France, Germany and the United States. The American delegation was headed by Owen D. Young, vice-president of the General Electric Company, and included Edward J. Nally and J. W. Elwood, president and secretary, respectively, of the Radio Corporation of America, and a large staff of experts. The Westinghouse interests also were represented. British interests were represented by Godfred Isaacs of the British Marconi Company; those of France by E. Tiradeau of the French Wireless Company, and those of Germany by C. Shapiro of the Telefunken Company. Radio facilities of the four countries will be pooled, but each country under the plan will retain control over its respective territory. It is thus hoped to eliminate great waste occasioned in the past by duplication of equipment by the different organizations, and at the same time to place at the disposal of the international company unlimited funds for an extensive program of development and research.

This conference followed the international radio congress, which recently ended two months' work in Paris and which recommended to all the governments represented greater use of wireless and closer co-operation between the big powers.



Variometers Couplers \$3.75 EACH

These instruments embody finest workmanship and best materials, all wooden parts genuine mahogany, coupler primary wound on formica tubing. Metal parts of brass. Wound for maximum results on short wave work. Will tune to 600 meters with small condenser. Shafts 3-16 in. With Chelsea Dial and Knob \$1 extra. Send for bulletin describing unwired regenerators and other apparatus.

FREDERICK WINKLER, Jr.
304 COLUMBUS AVENUE
New York, N. Y.

\$5 AUDION PANELS \$5

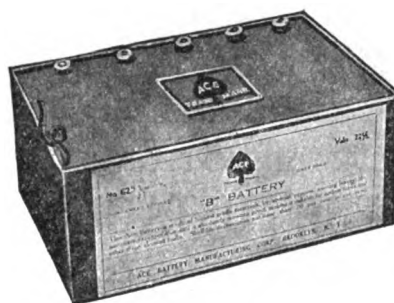
Panel is lettered, has grid leak and condenser, dial, posts for tickler, etc. Send 3c in stamps for enlarged lists and data.

50c for Audion Bulbs 50c
"ARK" RADIO SUPPLY
97 Hill St., Shelton, Ct. R.

LONGER LIFE MORE THAN A TRADE MARK



BETTER SERVICE A SIGN OF "B" BATTERY QUALITY



The new "Ace" # 627-45 Volt Variable "B" Battery is rapidly creating a remarkable reputation as to "Price," Quality, Service and Weight. The special size cell construction guarantees from 50% to 75% longer life than any 2 small size "B" Batteries. 16 Taps, 30 Voltage readings of from 1½ to 45 Volts obtained. Absolutely the best "B" Battery offer ever made. Size 6 in. x 5 in. x 2½ in. —weight, 3¾ lbs. Price, \$3.50. Demand "ACE." If your dealer does not carry "Ace" write to us. This list contains the six popular type "ACE" "B" Batteries.

Cat. No.	Size	Voltage	Lbs.	Taps	Price
623 Plain	2½ x 2 x 3½	22½	1		\$1.50
623 Variable	2½ x 2 x 3½	22½	1	5	1.75
625 Plain	3 x 4 x 6½	22½	5		2.50
625 Variable	3 x 4 x 6½	22½	5	5	3.00
626 Plain	3 x 8 x 6½	45	10		5.00
626 Variable	3 x 8 x 6½	45	10	6	6.00



Write for Cat. # 20. Ace Batteries are silent, moisture proof and absolutely guaranteed. DEALERS—Get in on this fast selling item.

264 Atlantic Ave. ACE BATTERY MFG. CORP. Brooklyn, N. Y.

10c Charges Your Battery AT HOME WITH AN F-F Battery Booster



and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament Storage Battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? The F-F Battery Booster is a Charging Apparatus, unflinching in its ability to deliver service day and night; is rugged, foolproof and requires no skill to operate; charging automatically and operates unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. Ammeter shows amount of current flowing. Everything Complete in One Compact, Self-Contained, portable Unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Current. New Models at Pre-War Prices:

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes.....	\$15
Bantam Type 12 charges 12 Volt Battery, at 5 Amperes.....	15
Type 166 charges 6 Volt Battery, at 12 Amperes.....	24
Type 1612 charges 12 Volt Battery, at 7 Amperes.....	24
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes.....	36

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping weights, complete with Ammeter and Battery Clips, 12 to 15 lbs. Order from your Dealer, or send check for Prompt Express shipment. If via Parcel Post, have remittance include Postage and insurance charges, or have us ship C. O. D. Order Now, or Write for Free Descriptive Booster Bulletin No. 33.

THE FRANCE MFG. CO.

General Offices and Works: Cleveland Ohio, U. S. A.
Canadian Representative: Battery Service and Sales Company, Hamilton, Ontario, Canada.

"THE LARGEST RADIO CHAIN STORE SYSTEM IN THE WORLD"

SEATTLE
PORTLAND
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BOSTON
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DURING THE MONTHS OF NOVEMBER AND DECEMBER

SORSINC PAYS THE POSTAGE

IN THE UNITED STATES

Order any standard makes of apparatus or parts at regular List Prices
TRY OUR MAIL ORDER SERVICE AND TEST ITS PROMPTNESS

And When You Need
a B Battery Try
A SORSINC



6400 Milliampere
Hours

Extra Long Life
For Reception
For Transmission

"The Largest B-
known"
\$4.00

RECOMMENDATIONS:

No. 30 Paragon Socket, condensite base....	\$ 1.00
No. 120A Fada Rheostat, thermoplas....	1.25
No. 110A Fada Series—parallel Switch....	.75
No. 111A Fada Ser.—par. Switch with 8 contacts and 2 stops.....	1.00
No. 112A Fada Inductance Switch.....	.50
No. 113A Fada Ind. Sw. with 8 contacts and 2 stops.....	.75
No. 303 R-S Antenna Ammeter 0-2½.....	5.75
No. 156 General Radio Socket.....	1.50
No. UR-542 RCA Porcelain Socket.....	1.00
No. UV-712 RCA Amplifying Transformer....	7.00
No. 226-W Federal Amplifying Transf.....	7.00
No. A-2 Acme Amplifying Transformer....	5.00
No. 21A Saco Glad Amplifying Transf.....	5.00
Parts for DeForest CV-500 Var. Cond.....	3.00
Parts for DeForest CV-1003 Var. Cond....	4.75
Parts for DeForest CV-1503 Var. Cond....	5.05
No. UV-200 Radiotron Detector Tube.....	5.00
No. UV-201 Radiotron Amplifying Tube....	6.50
No. UV-202 Radiotron 5 Watt Trans. Tube	8.00
No. UP-1718 RCA 5000 ohm Grid Leak....	1.65
No. UP-1719 RCA 5000 ohm Grid Leak....	1.10
No. PX-1638 RCA Rotary Grid Chopper....	7.25
Acme 50 Watt CW Transf., Mounted.....	15.00
No. 300-W Federal Filter Coil 800 M-A....	7.50
No. 311-W Federal Filament Transf. 200W.	15.00
No. UC-1632 RCA 1 mfd. Filter Cond.....	1.85
No. UC-1631 RCA ½ mfd. Filter Cond.....	1.35
RCA C.W. Instruction Book.....	.25

DEALERS—We are Jobbing all the important lines.
Write to our nearest Office for our Proposition.

SHIP OWNERS RADIO SERVICE, Inc.

80 Washington Street, New York City

BRANCH OFFICE STORES

PHILADELPHIA, 2006 Columbia Av.
BALTIMORE, 403 Lobe Building
NORFOLK, 26 Haddington Bldg.
SAVANNAH, 230 Broughton St., East
NEW ORLEANS 710 Maison Blanche
Annex
PORTLAND, ORE., 622 Worcester
Building
HONOLULU, 408 Boston Building

BRANCH OFFICES

BOSTON, 175 Commercial Street
GALVESTON, 313 Amer. Natl. Ins.
Building
SAN PEDRO, 432 Palos Verdes St.
SAN FRANCISCO, 24 California St.
SEATTLE, 3451 East Marginal Way
LONDON, 15 City Chambers, 65 Fen-
church St., E. C.

NEW PACIFIC COAST TRAFFIC MANAGER TO BE APPOINTED

The American Radio Relay League has requested Pacific Coast members to suggest names from whom to select a successor to A. E. Bessey as Pacific Coast district traffic manager. Pressure of other work has compelled Mr. Bessey to resign this position, but he continues as a director of the League. As the League notice did not reach Western members until Oct. 10th, action was to be taken on Oct. 15th. A request for delay was wired to Hartford, Conn., so that agreement might be reached locally before recommendations were made. Several excellent men are available—men of mature years, executive ability and a sympathetic understanding of the perplexing problems involved. The several radio clubs have their names under consideration and the indications are that the right man will accept this duty. The Pacific district has been divided so that hereafter Sebastian Ruth will care for the Northwest and Mr. Bessey's successor will look after California, Nevada and Arizona.

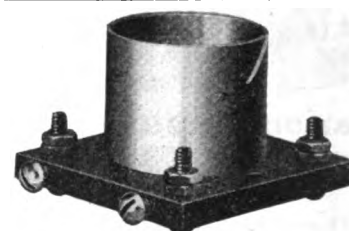
The "QSA" Line of Equipment OUR CATALOG

—is now ready. You can't afford to be without it. It lists the cream of radio apparatus made by the Leading Manufacturers. Each item a leader in its class, carefully selected by our expert. You will find it fills the gaps left by other catalogs. Generously illustrated. Don't do any buying until you see our catalog. You'll be glad we tipped you off. Sent for 10 cents in stamps or coin. This amount may be deducted from initial purchase amounting to 1.00 or more.

Send for it TODAY

INDEPENDENT RADIO SUPPLY CO.
3716 W. Douglas Blvd. Dept. P-11
Chicago, Ill.

"Better Results With Less Effort"



KEYSTONE V.T. SOCKET

Built to last—Formica base ¼ in. thick, 2¼ in. square, tube made of heavy gauge aluminum, with our new type locking notch. This socket can be mounted on base or on panel (screws furnished); springs are heavy phosphor bronze, and all metal parts nickel plated. Will fit all standard four prong tubes and by removing two screws, tube can be shifted to fit power tubes.

The best Socket made at the extreme low price of \$1.25 postpaid.

DEALERS: We have an attractive proposition for you.

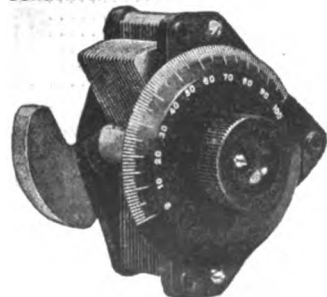
Order from this adv. or send for literature.

KEYSTONE RADIO COMPANY

Manufacturers
Drawer 307 Greenville, Penn.

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4¼x4½x3¼	1½	\$5.00
2	.0006 m. f.	Mounted	4¼x4½x2½	1¼	4.50
3	.0011 m. f.	With Dial	4¼x3x4	2	4.75
3	.0011 m. f.	Without Dial	4¼x3x4	2	4.35
4	.0006 m. f.	With Dial	4¼x3x3¼	1½	4.25
4	.0006 m. f.	Without Dial	4¼x3x3¼	1½	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

Say Radio to the Advertiser, it will help you.

BOY SCOUTS ENTERTAIN BY RADIO

On Oct. 3 the Boy Scouts of Oakland, Calif., entertained Oakland and hundreds of amateur radio operators in widely separated places with a wireless concert from the Fairmont Hotel, San Francisco. The receiving mechanism was operated by Boy Scouts, while the transmission was handled by the Leo J. Meyberg station on the roof of the Fairmont. Paul Steindorff took his entire sixty-piece orchestra to the Fairmont Hotel especially for the occasion, and his program was one of the most important radio demonstrations ever attempted in the west. Two songs were given by Miss Elfrida Steindorff and speeches in favor of the Boy Scout drive were delivered by Mayor James Rolph of San Francisco and Abe Leach, head of the committee which has the drive for funds in charge.

MINISTER PREACHES BY WIRELESS

An innovation in church services was introduced, Oct. 2, by Rev. H. A. Van Winkle, pastor of the First Christian Church of Oakland, Calif., who preached from the Hotel Oakland by wireless, not only to the members of his own congregation, but to thousands of others scattered for miles around on land and sea. Rev. Van Winkle sat in the hotel at a wireless telephone and preached his sermon into the receiver. Through the medium of the magnavox and wireless, thousands of listeners in different places heard his talk on "The More Efficient Way." The usual church music was also given over the radiophone by the choir. The Hotel Oakland Station is operated by P. D. Allen of the Western Radio School.

RADISCO

"Your Assurance of Satisfactory Performance"

RADISCO COUPLERS, COILS, "B" BATTERIES, AND OTHER GOOD INSTRUMENTS ARE FOR SALE AT 28 RADISCO AGENCIES ALL OVER THE U. S. SEE RADISCO SPREAD IN SEPTEMBER RADIO NEWS.

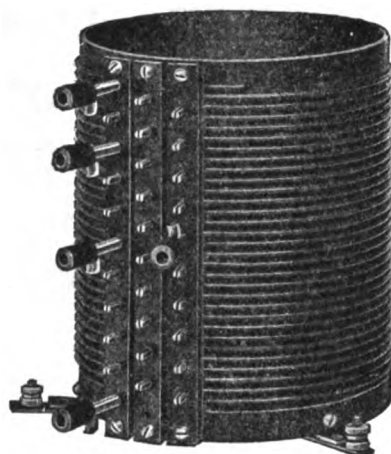
"B" BATTERIES

AN
EVEREADY
PRODUCT

43V. Batteries, tapped.....\$5.00
22½V. Batteries, Navy Type..... 3.50
22½V. Batteries, Commercial Type..... 2.50
Latter two types especially adapted to Cunningham and Radiotron Tubes.
Postage Prepaid Anywhere in U. S.
ETS-HOKIN & GALVAN
Wireless Engineers
10 Mission Street San Francisco

ARE YOU on our mailing list? Hundreds of amateurs received our October Bulletin. Did you? It contains a list of used apparatus at bargain prices. Everything in perfect condition and shipped subject to your approval. If the apparatus listed is not better than we claim it to be, we refund your money without question. Many fine instruments are offered for sale this month. Send for the list right now. It's free. Western Wireless Works, 5534 Edgerly St., Oakland, Cal.

C



W

Acme C. W. Inductance

5-in. Formica Tube; 30 turns heavy copper wire, tapped each in the form of slotted studs; tubular insulated terminals of proper size to fit studs. A Grid Coil is also available and easily adapted to this inductance.

Type L-1 C. W. Inductance \$8.00
Type G-1 Grid Coil 2.00

* * * * *

C. W. Power Transformers, Filament Heating Transformers, Modulation Transformers, Amplifying Transformers, Choke Coils, Amplifier, Detector, Spark Transformers, Special Transformers.

Write for bulletins of the most complete line of C. W. Apparatus

Acme Apparatus Company

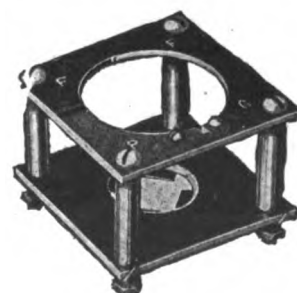
182 Massachusetts Avenue
Cambridge 39, Mass.

TRANSFORMER AND RADIO ENGINEERS AND MANUFACTURERS
New York Sales Office, 1270 Broadway

SOMETHING NEW

Made to Please You and Priced to Please Your Pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy, easily mounted socket that is heat proof, has bakelite-dielectric insulation, handy binding posts, etc., all for 75c.



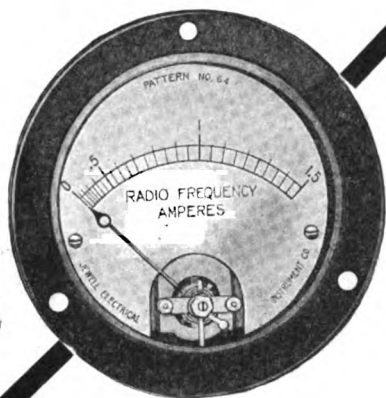
Type 128, Tube Socket
Price 75c Postpaid



Type 122 Rheostat
Price 90c Postpaid

And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

THE WILCOX LABORATORIES
LANSING, DEPT. J., MICHIGAN



Use Thermo- Couple Instruments for C. W.

☐ All long distance C. W. operators use thermo-couple ammeters. ☐ Precise electrical measurements are the basis for the successful operation of any C. W. set. ☐ Unreliable and inaccurate instruments will result in the unreliable operation of any set. ☐ Government Bureau of Standards tests have shown Jewell thermo-couple instruments to be accurate and reliable.

Price \$12.00

Get Our New Radio Instrument Circular From Your Dealer

JEWELL ELECTRICAL INSTRUMENT CO.
CHICAGO

FREE

(FOR THIRTY DAYS)

Your choice of one of the following premiums given free with one subscription to "RADIO" at \$2.00 a year.
Remler 3" dial and knob. Remler Grid Condenser, Remler Bakelite Socket, Remler Grid Leak, Remler Rheostat.
12c must be included for Mailing Charges.
(FOR THIRTY DAYS)

RADIO, 465 Pacific Bldg., San Francisco

NEW MOTORS FOR ALL PURPOSES
STANDARD MANUFACTURERS
PROMPT DELIVERY
ALL SIZES UP TO 5 H.P.
We Specialize In Small Motors & Generators
ALL PHASES AND FREQUENCIES IN STOCK AT ALL TIMES
Largest exclusive Mail Order Small Motordealers in the world.
CHAS. H. JOHNSTON, Box 38, West End, Pittsburgh, Pa.
WIRELESS, TELEPHONE GENERATORS
500 VOLT - 100 WATT - 3400 R. P. M.
FOR MOUNTING MOTOR GENERATOR SETS.
\$28.50 EACH
WRITE FOR CATALOG

Radio Amateurs of COLORADO, UTAH, NEBRASKA and WYOMING, do you know

DENVER

Has the Largest Wireless Supply Store in the Middle West!

A complete stock of all standard Radio Supplies, from which we make IMMEDIATE DELIVERY

Special: De Forest Radiophone

Start with the "Interpanel" system and thus avoid discarding apparatus

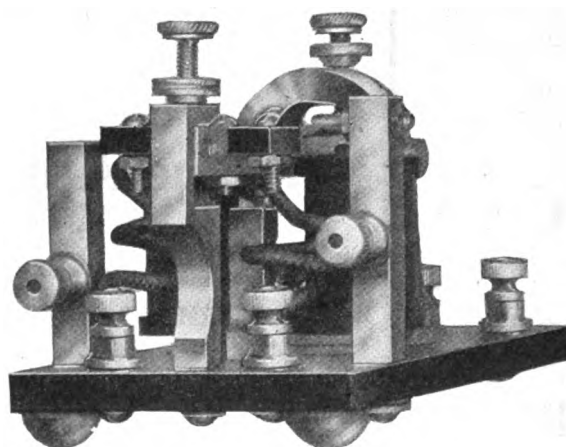
Write for our Bulletins and Price List. We will give prompt Mail Order Service by Parcel Post or Express, as requested.

Our "REYNRAD" Short-wave Coils are best on the market, \$2 each.

REYNOLDS RADIO CO., Inc.

613 19th St.

DENVER, COL.



C. W. or Spark

A Universal
Break-In-Key

Send and Receive at the Same Time with This Automatic Relay

Why bother with an aerial switch when this break-in-key will take its place? It is an automatic relay that breaks the power circuit, breaks the aerial circuit and shorts the receiving set, all in one operation. When the key is down you send, when it is up you receive. Works on 3 volts.

You can hear the other station while you are sending and stand-by until he is through. Fool-proof and fully guaranteed to deliver the goods. Bakelite base, all metal parts highly nickel plated. Diagram furnished with each relay. Will handle 1 K.W. Price, only \$9.75, postpaid anywhere in the U. S.

Permanent Reduction on Variometers and Variocouplers, \$4.50 and \$3.50, respectively. Postage 25c. See last month's ad.

Send for Monthly Bulletin

Western Wireless Works

5534 Edgerly Street, Oakland, Calif.

DISPLAY ROOMS—5387 Bond Street

C. W. CLUB OF CALIFORNIA (Continued from Page 141)

Mr. Lawrence Mott,
Catalina, Calif., Avalon.

Dear Sir: As I sit here and listen to the very excellent music being rendered by the new set of L. J. Meyberg, while reading your page in "Radio" devoted to California C.W. Club, it occurred to me that you were doing an interesting and good work. (Pardon jazz in writing, but the durn phonograph is reproducing "Sweet Mama") so I decided just on the spur of the moment, to offer my little bit for your use if suited, together with proof of the DX records.

The set of which I shall give diagram was built by myself early in the phone game here in Los Angeles, in fact the only other regular phone set working was one operated by 6XN.

You will note from both cards that voice was put through, though not very successfully insofar as communication was concerned, the C.W. being used for that purpose. But voice was understood.

The radiated amperage when working 7ZT was .5 and when working 5ZA was .4. The set was at that time at Olive (when working 5ZA only), 30 miles east of Los Angeles, and 6ER was signing off hence the card was addressed to him. Had to use series condenser, 43-plate Murdock, in order to reduce down to 200 M.

Am now using a more advanced set

and can supply information if you care to have some for future use.

Apologizing again for the jazzy nature of this letter, due to the music that continues to haunt me, I am,

Yours for C.W. predominance,
6JE.

Chas. E. Blalack.

A sense of justice compels me to add that in both these instances, 7ZJ and 5ZA I was qsp'd by spark friends.

Sept. 17, 1921.

Mr. Lawrence Mott,
Avalon,
California.

Dear Sir: I wish to be enrolled as a member of the progressive C.W. Club of California. My C.W. set consists of two 50-watt tubes. At the present time through the lack of proper high voltage I am only radiating $1\frac{1}{2}$ amperes on C.W. and 1 ampere on voice.

I would like to be placed on your C.W. schedule as soon as possible. It will only be two or three weeks until I will have the proper high voltage. At the present time my wave length is 210 meters. This is the lowest I can get, as I have only one complete turn in the antenna and one in the ground circuit. Sincerely yours,

PAUL D. LANGRICK,
(Radio 6ATB).

510 North Lake Street.

NEW C.W. CLUB MEMBERS

7RV—W. Morton, 6523 Forty-fifth avenue S. E., Portland, Ore. Schedule: 11:10 P. M., Tuesday, Thursday and Saturday.

6AQT—M. Graham, 6784 Hollywood boulevard, Hollywood, Calif. Schedule: 11:10 P. M., Monday, Wednesday and Friday.

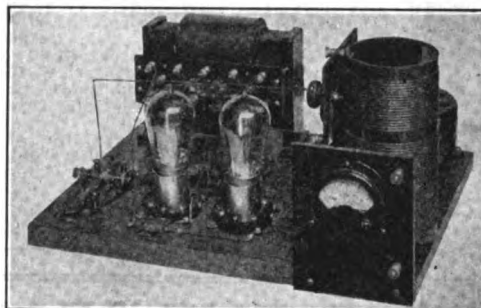
JURY RECOMMENDS RADIO COMPASS

Responsibility for the wreck of the steamer Alaska off Blunt's Reef recently has been placed on Capt. Harry Hobey by a coroner's jury which returned its verdict after several weeks of taking testimony in the cases of two persons drowned. Captain Hobey went down with his ship. Other officers were exonerated.

Blame for the wreck was placed on Captain Hobey because of his failure to check his position by radio compass bearings, failure to take soundings and failure to observe proper precautions at hearing fog warnings. The coroner's jury recommended that more general use be made of radio compass bearings, furnished by the U. S. Radio Service, and that owners of passenger-carrying vessels be required to equip their ships with a listening device for the detection of submarine sound signals from submarine bells.

BKUMA YRLSUG—TWO HUNDRED beginners tell how memorize wireless code in thirty minutes to two hours. Booklet, six red stamps. Dodge, Box 220, Mamaronck, N. Y.

An Amateur C. W. Set That You Can Easily Assemble Yourself



Connects directly to 110 volt A.C. lighting circuit — Approximate Range 400-500 Miles — Conservative Range 250 miles.

The approaching Radio season will well show a decided increase in C. W. transmission.

The remarkable ranges which may be obtained by even the most simple C. W. transmitter have changed the entire amateur outlook. Previous to the event of C. W. transmission a range of 50 to 100 miles was average work. Today an amateur—skilled or unskilled—can assemble a simple C. W. trans-

mitter which will surpass his expectations. The illustration above shows a simple C. W. set, the parts of which are attached to a baseboard. Anyone can assemble this outfit and wire it up. We have selected the necessary units for assembly, as follows:

Parts for Amateur C. W. Outfit

1 "Acme" 200 watt power transformer.....	\$20.00
2 Radiotron UV 202 5 watt transmitting tubes.....	16.00
2 "General Radio" tube sockets.....	3.00
1 "National" Rheostat, 3 ohms, 6.5A.....	5.00
1 "Tuska" 3-circuit inductance.....	12.50
1 Grid Leak, 10,000 ohms.....	1.25
3 condensers.....	3.00
1 C. W. Key.....	3.00
1 Radiation meter 0-2.5A, T. A. W.....	5.00
1 B. D. Panel for meter (with pole and binding post)....	1.50
1 Wood base (stained).....	1.50
Complete parts, packed, ready for shipment.....	\$72.25

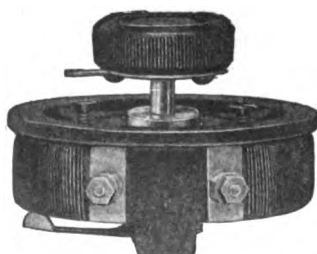
ATLANTIC RADIO CO., Inc.

727 Hoylston Street
Boston, Mass.

We have a liberal supply of the Radio Corporation's new Instruction Book on C. W. Operation, and will gladly send you a copy direct, at once, on receipt of 25 cents.

Branch, 15 Temple St.
Portland, Me.

UNEXCELLED FILAMENT RHEOSTAT



A vacuum tube filament rheostat must be more than a mere current regulator. It must be an instrument mechanically and electrically perfect. To eliminate tube noises the switch blade must make smooth and positive contact.

Our Type 214 Rheostat is made exactly for this severe service. It is made in several sizes, for receiving tubes, for 5 watt transmitting tubes, for grid biasing, and is made for front of panel or back of panel mounting.

Price \$2.50

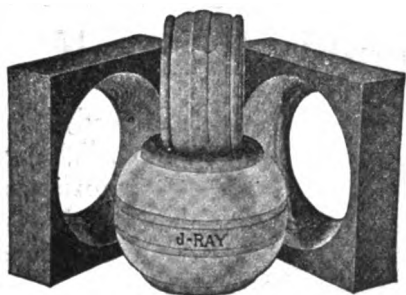
All described in free bulletin 909C

GENERAL RADIO COMPANY

Massachusetts Avenue and Windsor Street Cambridge, 39 Massachusetts

Say Radio to the Advertiser, it will help you.

VARIOMETERS AND VARIOCOUPERS



in knockdown form will enable you to make a large saving in the cost of your receiving outfit. Beautiful non-shrinking mahogany wood is used thruout, with accurate turning and perfect workmanship. The best buy possible at the following prices:

Variometer, unwound.....\$2.00
Stator..\$1.00 Rotor...\$1.00
Variometer, wound.....\$3.90
Stator..\$2.10 Rotor...\$1.80

Coupler Secondary Ball.....\$.75
All parts drilled and ready for assembling, with directions furnished.

We carry a complete line of Radio Supplies. Will you try our Service?

J-RAY MFG. CO., 2131 DeKalb St., St. Louis, Mo.
Send for Catalog

WE USED OUR BEAN

IN DESIGNING

THE PARKIN DIAL RHEOSTAT (pat. pending) and by mounting the resistance element in a circular groove in the back of a 3" molded Bakelite dial eliminated one part and saved you the cost of a dial. The groove being recessed, allows the dial to clear the panel by the usual distance of 1-16". An off position is provided and a stop on the dial engages the stationary contact at the extreme positions. The 360-degree rotation insures fine adjustment. A brass bearing insures a true running dial and smooth action.

All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob. Resistance is 5 ohms, carrying capacity 2 amps.

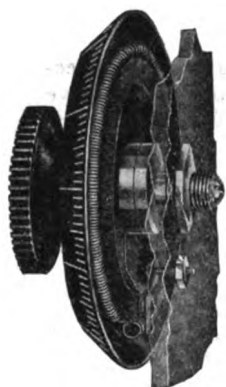
No. 77 Parkin Dial Rheostat, postpaid.....\$1.75

FOR SALE BY ALL LEADING DEALERS.

Send for free catalog, No. 3, describing our complete line. Dealers: Write for proposition.

PARKIN MFG. CO.

SAN RAFAEL, CALIF.



THE HAM'S SOLILOQUY

Obey or not obey, that is the question:
Whether 'tis better in the end to suffer
The laws and rulings of the radio inspector
Or to take up arms against the troubles of the air
And by opposing end them; to quit, to send
No more, and by quitting to say we end
The QRM and the thousand natural shocks
Our flesh is heir to? 'Tis a consummation
Devoutly to be wished. To quit, to stop,
To stop, perchance to miss, aye there's the rub,
For while we stop what concerts come
When we have taken off that tittler coil
Must give us pause. There's the respect
That makes pleasure of so long hours.
For who would bear the whips and scorns of dad,
The scant pocketbook, the spark-set's vexations,
The pang of a discharged cell, the code's mix-up,
The tubes' burning out, and the scoffs
That patient merit of the unworthy takes,
If 'twere not for the fun and fascination
Of being a radio bug? Who would these burdens bear.

To curse and swear at interference,
But that the chance of hearing something after dark

From that undiscovered country of the air from whose bourne

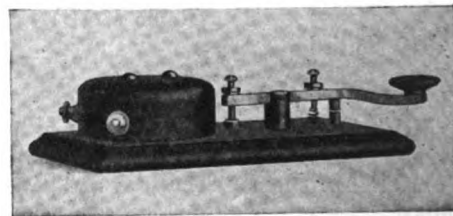
Every message comes, puzzles the will

And makes us rather bear the ills we have

Than pass up the sport of radio.

—A. H. H., with apologies to Shakespeare.

LEARNERS SETS



With code, instructions, lever key (all brass) and the **AJAX BUZZER** \$1.80. Sending keys bakelite base, lever type, all machined brass, \$1.50. Unmounted \$1.00.
60c—**AJAX HYTONE BUZZERS**—60c external tone adjustments. All postpaid.
AJAX ELECTRIC CO., 8 Palmer St., Cambridge, 38, Mass.

Tresco Tuners are Complete No Loading Coils are Needed

USED ALL OVER THE WORLD

5000 to 20000 M.....\$10.00 add P. P. Type R.S.
700 to 5000 M.....10.00 add P. P. Type A.S.
200 to 700 M.....10.00 add P. P. Type C.S.

Coils of either for panels, \$6.00 plus P. P.



Knocked-Down Panels for Our Tuners—Set Them Up and Save Money

Consists of Formica Panel—drilled ready for parts—
one Rheostat, one 11 Plate condenser, H. V. switches, points, base and necessary binding Posts.
V.T. socket, \$1.00 extra. Shipping weight, 4 lbs.
Price, \$6.00. Add Parcel Post.

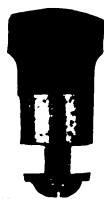


KNOCKED DOWN CONDENSERS

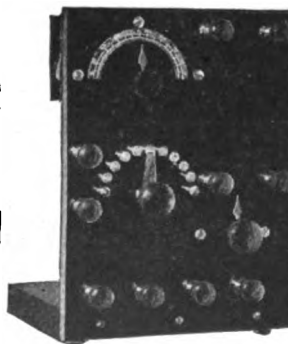
Assemble and save money

11 Plate.....\$1.80
21 Plate.....2.25
41 Plate.....3.20

Add P. P.



Full size



TRESCO BINDING POST

H.R. Top, Polished Nickel
Base, as cut, \$1 for 10 of them. Add P. P. The best made for your panels.

Filament Rheostats.....\$1.25
5 Watt Tube.....1.50
Switches, our type......60
Switch Points, doz......45

Dealers in Every City

TEL-ELECTRIC CO., HOUSTON, TEXAS—Distributor for Southwest

10c brings Wonder Catalog of 24 Pages

TRESCO - DAVENPORT - IOWA

Send for

ABC

Catalogue

A marvelously easy to understand instruction book on most advanced radio methods, because it describes in detail the unusual mechanical and electrical features and simplicity of the complete ABC line. Sixteen pages, clearly illustrated, in two colors. Every price quoted in this catalog represents a new low level for apparatus of recognized quality. Send 10c for latest ABC catalog, "Professional Radio Equipment at Amateur Prices." Request Catalog CX11.

WIRELESS EQUIPMENT CO. Inc.
32 Austin Street, Newark, N.J.



Licensed under Armstrong U. S. Patent
No. 1,113,149

**KENNEDY
EQUIPMENT**

Announcing

the new

KENNEDY INTERMEDIATE WAVE REGENERATIVE RECEIVER

TYPE 220

RANGE 175 TO 3250 METERS

Detects, regenerates or oscillates as desired at any point in its range

This new receiver fully sustains the reputation for high quality which Kennedy apparatus has established. We believe there is no other receiver on the market which displays such concentrated quality value in design, workmanship, finish and performance as is embodied here.

You will be interested to know more about this new unit. Ask your dealer to show it to you. If he has none in stock, we will gladly send you Bulletin 201 on request.

THE COLIN B. KENNEDY COMPANY

INCORPORATED

RIALTO BUILDING

SAN FRANCISCO



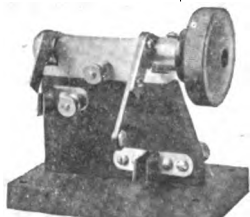
"Signal" Radio Apparatus Pleases Professional and Amateur

Because it is built to the exacting requirements of the professional radio-electrician, SIGNAL wireless products are bound to fulfill every requirement of the exacting amateur. And the name SIGNAL is the only thing to be certain of in buying!

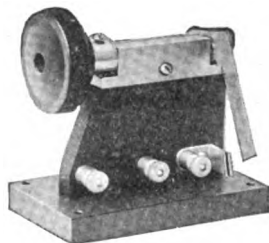
AERIAL CHANGE-OVER SWITCH

Reduced to fewest words, the superiority of this SIGNAL Switch is due to the fact that it has the good features found in highest priced amateur change-over switches, plus all the qualifications of the modern antennae switch. Lack of room prevents recounting these features here; one point alone should suffice, however, as an ex-

ample: That is the arrangement whereby the aerial is drained of any accumulated charge before the switch reaches receiving position. Search and you'll find this feature only in the most



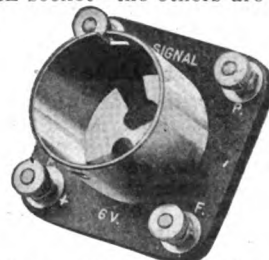
Transmitting Side



expensively built commercial aerial switches. And any operator who is "wise" to the nasty kick in telephone receivers, when shifting quickly from send to receive, will appreciate this SIGNAL advantage.

THE SIGNAL "V. T." SOCKET

The only vacuum tube socket on the market today that will take any of the standard four-prong tubes, either Detector, Amplifier or Oscillator, without changing or adjusting. And this is not the only distinguishing mark of this SIGNAL socket—the others are all told



in the latest SIGNAL Bulletin of High Class Wireless Apparatus, which is yours for the asking.

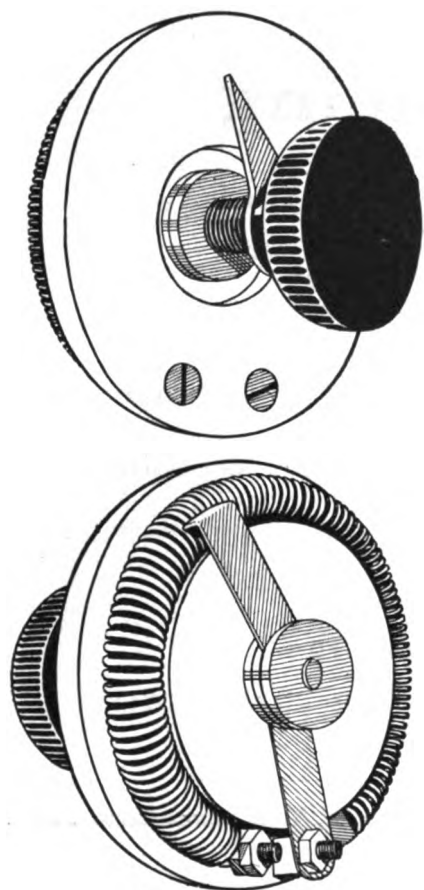
Write for the SIGNAL literature now—it is free. Address

Signal Electric Manufacturing Company

MENOMINEE, MICHIGAN.

SHRAMCO

-- REO --



For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

BACK MOUNTED panel rheostat, specially designed for the Radio-tron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2 1/4 in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt. Detector and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2 1/4 in. base.

SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

GENERAL PUBLIC BUSINESS

(Continued from Page 138)

Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Outposts report entire Pirate Cove gang preparing embark in dories and power boats, heavily armed. We are well entrenched in; allies arriving daily from outside islands; will help us defend Unga against enemy. Ship complete new transformer primary, rotary-gap motor, exciting generator armature, three fire extinguishers and one dozen Hellkum Never-Fail, Kick-back Preventers. Superintendent Hooley wants three bundles first quality grave-digger's shovels. Radio K-V-I.

A Red (Government), U. S. N., Dutch Harbor, Alaska.

Commander Thirteenth Naval District, Bremerton, Wash.:

Information at hand indicates that it may soon be advisable to send a number of gunboats up to the Shumagin Islands. Full details being forwarded in a report which you will receive by next mail schooner leaving here some time next summer. Naval Radio, Dutch Harbor.

Rush Telegram, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

Pirate Cove gang are coming. Radio K-V-I.

Rush Telegram, San Francisco, Calif.

Radio, Pirate Cove, Alaska.

Having checked up Superintendent Krugscaller's latest reports and examined our bills in this office, we find that general public operation of Pirate Cove radio station for two months has cost as follows:

Apparatus and repairs shipped.....	\$3152.21
Telegrams about radio.....	98.76
Extra engine fuel.....	2640.00

Total.....\$5890.97

Against this we have a tariff on three paid messages received, totalling 26 words at six cents a word, amounting to \$1.56, and leaving a deficit of \$5889.41. This does not include boats and dories smashed by fighting fishermen. Public service operation of K-O-X-N is hereby suspended. You are now returned to a limited commercial license. Great Alaskan Fisheries.

Day Letter, Unga, Alaska.

Alaskan Codfish Company, San Francisco:

No fight. Enemy abandoned plans for attack, following receipt of advice that Pirate Cove P-G license has been cancelled. I have driven competitor out of the field by superior operating ability and feel that I am entitled to a substantial increase in my salary. Russian code messages running about 500 words a day at present. Please advice at once about salary. Radio K-V-I.

Say Radio to the Advertiser, it will help you.



*Wish
Your
Friend
a*

Merry Radio Xmas

*only two months more and
Christmas will be here again*

Make it a
Radio Xmas
and "shop early"

The most appropriate gift for a radio friend is a subscription to a radio magazine.

Send him

RADIO

for one year

Just write his name and address on a piece of paper, send us \$1.50, and we will enter his subscription for one year, starting with the December (Xmas) number—the big 68-page holiday issue. Our regular subscription rate is \$2.00 a year, but the holiday price is only \$1.50.

Besides sending him the magazine for a year, we will mail him a beautiful Christmas card, telling him of your holiday gift. The card will reach him on Christmas Eve.

Send us the order today and avoid the rush!

All Subscription Orders for this special offer must reach us before December Fifteenth.

RADIO

465 Pacific Building
San Francisco, Calif.



G. M. PROUDFOOT

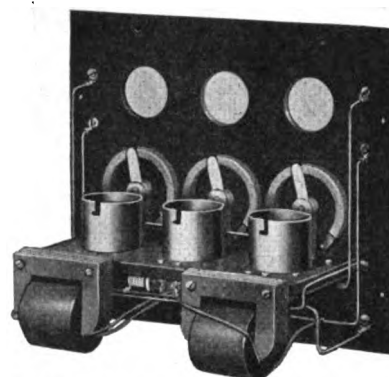
DETECTOR AND TWO-STEP AMPLIFIER

Highest Quality Lowest Prices

Detector and One-Stage Amplifier

\$25.00

is duplicate of above only one unit less



The Operating Characteristics of All Our Instruments Are Equal to Any on the Market Regardless of Price.

\$35.00

The design and construction are such that maximum amplification is obtained and no howling.
Panel 3/16 in. hand rubbed and engraved with white letters. Instruments look better than photographs.
Cabinet 5 in. deep. Bakelite is 7 1/2 in. x 8 3/4 in. Plug for fones furnished with each instrument.

CABINETS
QUARTER SAWED OAK
WITH WAX FINISH—
MAHOGANY FINISH
IF DESIRED

NOTICE
CLEAN CUT WIRING

NOTE THESE PRICES

Detector Cabinet, Fixed Condenser, Grid	
Leak, complete	\$ 10.00
One-Stage Amplifier	18.00
Two-Stage Amplifier	25.00
Detector and One-Stage Amplifier	25.00
Detector and Two-Stage Amplifier	35.00
Detector and Three-Stage Amplifier	65.00
Long and Short Wave Receiving Set—	
150-25,000 Meters	195.00

ALL INSTRUMENTS
TESTED IN LABORATORY
AND
UNDER WORKING
CONDITIONS

EVERYTHING
GUARANTEED

361 E. OHIO STREET

G. M. PROUDFOOT

CHICAGO, ILLINOIS

We manufacture our own jacks, which allows **shortest connections possible** and more permanent construction than with telephone jacks. Automatic filament control by plug, \$10.00 additional.

"A JOURNEY of a thousand miles," said Lao Tzu, "begins with a single step!"

"Let a Grebe Receiver be the first step of your radio-journey—lest you be compelled to return and start anew."

Doctor Wu

The CR-9 Receiver is the ideal equipment for C. W. and radiophone reception.

A Regenerative Receiver—150 to 3,000 Metres—moulded variometers, tapered-grip dials, rubber-tired verniers, direct-reading rheostat controls, automatic plug and jack filament control system.

So simple to operate—connect antennæ, ground, batteries—insert tubes—and *listen!*

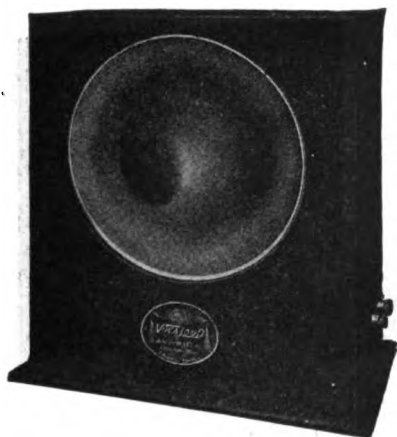
THE SINE OF



THE RIGHT KIND

A. H. GREBE & CO., Inc.
Richmond Hill, N. Y.

Say Radio to the Advertiser, it will help you.



— THE —

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3/4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G8, 4 West Park St.,
NEWARK, N. J.

John Mills, No. 1,385,091, July 19, 1921
—Signaling.

A receiving system arranged to minimize the possibility of the production of false signals due to static, etc. The detector tube 3 transmits the signal to two circuits, 22 and 23, the latter being tuned to the audio frequency of the signal. By balancing the energy dissipated in these two systems, this energy being integrated for a period longer than that of the oscillation in circuit 23, it is possible to neutralize the disturbing influences. The energies are transformed into heat in the wires 26 and 29, which jointly control a contact 32 between two stationary contacts. Static disturbances have equal effects on wires 26 and 29 and the contact 32 simply moves parallel to the faces of the stationary contact while no signal is sent. Due to the use of integrated energy, irregularities in the instantaneous values of the disturbances have no bad effect.

POLITICAL SPEECHES BY RADIO

Now comes a suggestion from Chester Rowell, member of the California Railroad Commission, that by means of radio a candidate can sit at home and address gatherings of the entire electorate assembled in public squares, public halls or private homes equipped with magnavoxes and radio receiving sets. Ah, but where would the minatory finger of Sam Shortridge be, or the clenched hands of Hiram? Under this plan Theodore Roosevelt never could have shown his teeth or Bryan his seersucker suit. But the suggestion opens the mind to what the future has in store.

Classified Advertisements

Advertisements in this section are three cents per word net. Remittances, in form of currency, money order or stamps, must accompany order.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bldg., San Francisco, Calif.

STOP! LOOK! AND ACT! V. T.'s. With each Radiotron UV200 V. T. detector or A-P Moorhead V. T. detector or Radiotron U. V. 201 V. T. Amp. or A-P Moorhead V. T. amp., we will supply free of charge your choice of either a Murdock V. T. socket, improved contact type, or a Remler Bakelite smooth running rheostat, latest type. Radiotron UV200, \$5. Radiotron Amp. V. T. UV 201, \$6.50; Moorhead A-P detector, \$5.00; Moorhead A-P Amp. V. T., \$6.50; Remler Bakelite rheostat, latest type, \$1.00; Murdock V. T. socket, \$1.00. We absolutely guarantee the foregoing apparatus. Only new and high-grade equipment carried in stock. All orders are filled within twelve hours and shipped postpaid and insured, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. F, Ahlberg, Kansas.

MURDOCK ROTARY GAP, complete, \$6.00. Harold Thiel, 27 Elgin Park, San Francisco, Cal.

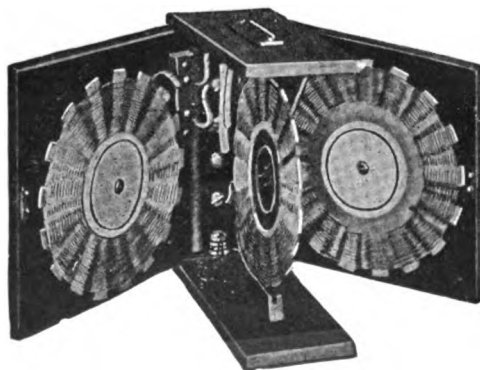
COMPLETE I K.W. transmitting set of radio 6AEI for sale, \$65.00. A bargain. Harvey Blackmun, Winton, Cal.

THE BEST Christmas gift that you can send your radio friend is a subscription to "RADIO." We will send him a beautiful Christmas card, telling him of your generous gift. Let us have the order now. Shop early and avoid the rush. Pacific Radio Pub. Co., Inc., 465 Pacific Bldg., San Francisco, Cal.

STUNG AGAIN—He thought he could get away with it, but it N. D.-O. M. cheap apparatus never did and never will give satisfaction. He tried others, but finally turned to us. Why? Because we make nothing but first-class apparatus, using standard makes of instruments, and yet our prices are low. Now he's satisfied. Try us and see why. "There's a reason." Yours truly, Montebello Radio Shop, Montebello, Calif.

ONE ESCO 550 Volt 1/4 Amp. Motor Generator, 110 Volts A. C. Never used. \$75.00. Perfect condition. Cost \$85.00. 1 Jewell 0-500 Volt Meter, \$10.00; cost \$15.00. Reason for selling: going out of the radio game. C. MAASS, 250 21st Ave., San Francisco.

SPIDER WEBS



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

WONDERFUL
REGENERATIVE
SIGNALS

NO MAGNETIC
LEAKAGE

\$5.50
Plus 30c
Postage

NEW DUPLEX
1000 METER
SET ON HAND

HERROLD LABORATORIES

"Everything for the Amateur"

407 SOUTH FIRST STREET

SAN JOSE, CALIF.

Who Enjoys Your Set?

Do you? Of course, but think what sport it would be to discard those awkward, tiresome and uncomfortable head sets—do away with them entirely—and get everything loud and clear all over the place.

And wouldn't it be great to treat your friends and neighbors to a radio music concert whenever you felt like it, or let them enjoy hearing the news events of the world as you pick them up by wireless.

And you can—with the Radio MAGNAVOX—do all this and more, easily and inexpensively. Ask your dealer about this marvelous wonder instrument or write us direct. Do it now, and make your set the source and center of enjoyment it should be.



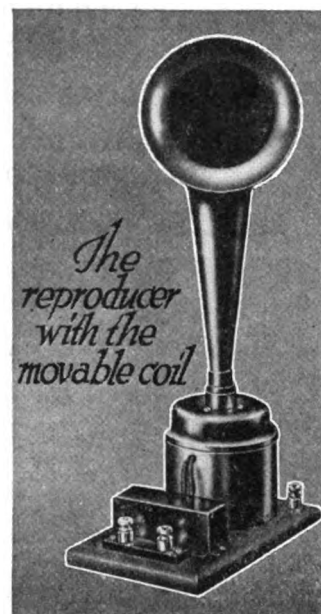
Dealers: Write for Proposition

Send for FREE Card—

illustrating and describing the hook-up and operation of the Radio MAGNAVOX and the famous "movable coil" which makes it so efficient. This interesting card free. Send for it NOW.

General Offices and Factory
OAKLAND, CALIFORNIA

New York Office
370 Seventh Avenue
(Penn. Terminal Bldg.)



THE RADIO MAGNAVOX

A beautiful and efficient outfit, made in two sizes. Type R-2 uses $\frac{1}{2}$ ampere in field, Type R-3 1 ampere. Any amount of current can be used without distorting signals or injuring apparatus. Any one can operate the MAGNAVOX. Price, complete as illustrated—Type R-3 \$45 Type R-2 with 22" horn...\$110

At your dealer or direct from factory

FEDERAL HEAD TELEPHONES

Rugged—Lightweight—Sensitive



These Head Telephones were developed under the rigorous specifications of the Army and Navy for war-time use and proved highly satisfactory. The construction affords a light weight and sensitive head set that will satisfy the most exacting amateur.

No. 53-W Federal Head Telephones, 2200 ohm....Price \$ 8.00
No. 52-W Federal Head Telephones, 3200 ohm....Price 10.50

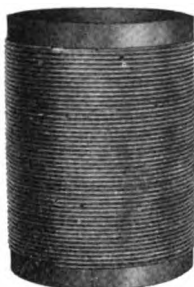
Write for Bulletin 103-W.B. describing latest C.W. and Spark Transmitting Equipment Receiving Apparatus and parts. Amplifying Transformers, Head Telephones, Pieophone, Variable Condensers, Anti Capacity Switches, Filament Control Jacks and Plugs, Etc.

Ask your dealer for Federal equipment. If he does not have them tell us his name

Federal Telephone & Telegraph Co.

1738 Elmwood Avenue, Buffalo, N. Y.

< STANRAD >

GEN Works 1000 Miles on 10 Watts CW**You Can, Too!***With Apparatus Designed for***RESULTS EFFICIENCY SERVICE**

The "STANRAD" inductance is built for RESULTS—that's what you want—RESULTS!

It has 54 turns of copper wire wound on a 4-inch threaded formica tube. The wire cannot slip or come loose.

The margin at each end makes it easy to mount by means of brackets, mounting posts, etc.

One or two-coil winding. **\$5.00**
Threaded tube only..... **3.75**
Inductance for 100 watts. **10.00**

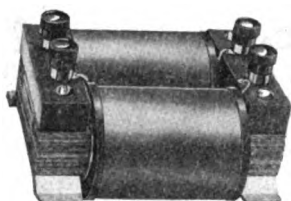
The choke coils are wound on fiber spools. This eliminates break-downs. Binding posts are provided for connections, and aluminum feet to simplify the mounting. The inductance, approximately 3 henrys, is enough to clear the worst hum.

500 M. A. **\$7.50**
150 M. A. **6.00**

If your dealer cannot supply you, write direct.

STANDARD RADIO COMPANY

1048 So. Olive St., Los Angeles, California



FORMICA

SHEETS - TUBES - RODS

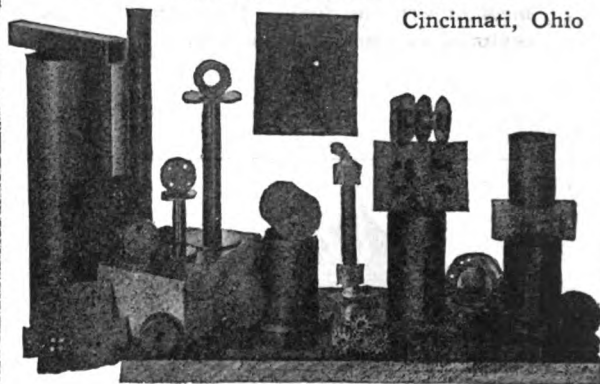
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:

Hermans-Griffith Co., Sheldon Bldg., San Francisco

Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco; Wireless Shop, 511 W. Washington St., Los Angeles; Northwest Radio Service Co., Seattle, Washington.

Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser,
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

609 Fourth Avenue

SEATTLE

WASHINGTON

FIELD WIRELESS

Firefly and cricket
Have set up their wireless
In the fields, and tireless
They flash and click-click it.

What are they saying?
The long day is over;
The dew's on the clover:
It's time to stop playing.

There's more. They are spelling
Which way the wind's blowing.
How fast thing are growing,
How good they are smelling.

Oh! I wish I could utter
Half that they're sending
And receiving, blending
Their spark and their sputter.

Sometimes you feel creepy
To think they are talking
With things that go walking
When people grow sleepy.
—B. A. Botkin, in N. Y. Evening Post.

President R. P. Schwerin of the Federal Telegraph Company has concluded a contract with the Chinese government by which that government is to issue bonds, which apparently are to be turned over to the company, with which to construct five radio stations of great power at various Chinese ports.

Valuable New Features Added to Eveready Battery

The manufacturers of Eveready Wireless B Batteries announce two new features which are now being built into the No. 766 Battery, and which greatly increase its usefulness.

No. 766 Battery is now being made with wood container, of the same character as No. 774. This wooden case is impregnated with melted paraffine, making the battery, which is also sealed in wax, practically impervious to moisture.

A second feature—and one which is welcomed by all radio fans—is the installation of variable voltages. One negative and five positive terminals give a voltage of $16\frac{1}{2}$, 18, $19\frac{1}{2}$, 21 and $22\frac{1}{2}$. Each terminal consists of a flat brass strip with 3-16 hole in end for binding post.

These new features of the No. 766 are in line with ideal of the manufacturers of Eveready Products—to lead with the best.

And the price remains the same—\$3.50.

No. 766



No. 766

NATIONAL CARBON CO., Inc.

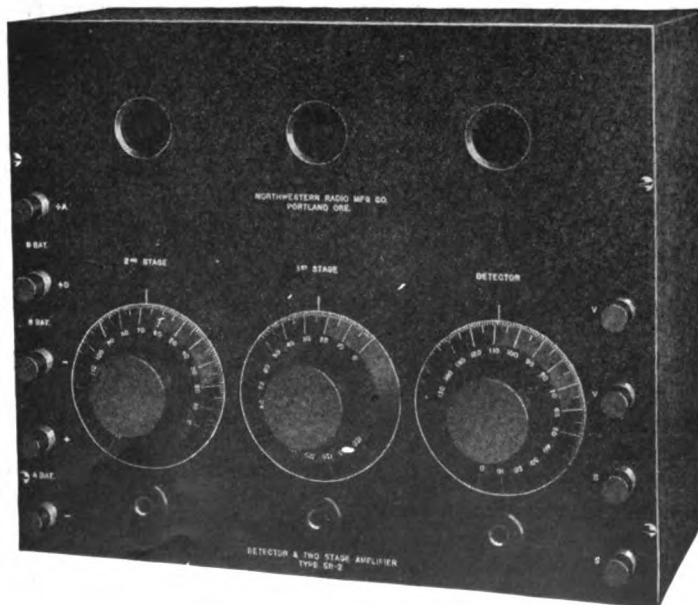
599 EIGHTH STREET

San Francisco

California

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

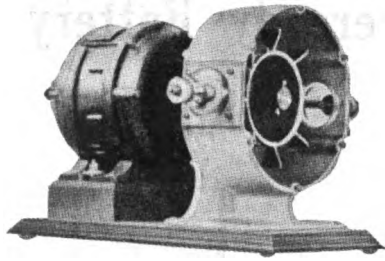
Detector and two stage amplifier Type SR-2.
Size of panel 10 1-2x12 3-4. Complete less
tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

Say Radio to the Advertiser, it will help you.



Benwood Rotary Quenched Spark Gap

The finest synchronous gap made
A REAL GAP AT A REAL PRICE

The outstanding features are:
A Removable & Renewable Point Rotor
Green Pyrex Glass Insulators
Silent in Operation
Visible Spark

Furnished with machined aluminum coupling that makes slippage impossible and at the same time makes the adjustment for synchronism a simple affair. Complete, as shown, on hardwood base with finest 1800 RPM motor available:

\$65.00 aluminum housing \$60.00 Bakelite Housing

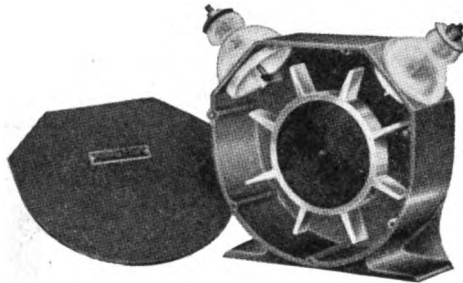
MOTORS SEPARATE (SYNCHRONOUS), 1800 RPM 1/4th H. P. (Prepaid) \$30.00
ALUMINUM GAP SEPARATE, with glass insulation and type "R" disc.. 28.00

The Benwood 'Super' Gap

Complete as shown with
Green glass insulators
Removable point disc (machine stamped)
Bakelite insulation

ANY NOTE
INCREASED RADIATION
VISIBLE SPARK

New Low Price, \$22.00



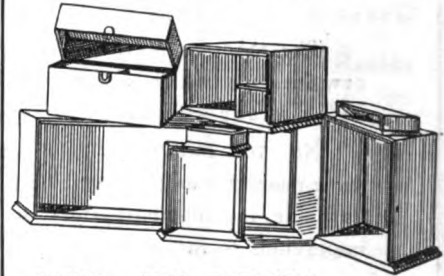
Send for our new fall and winter "BENWOOD BULLETIN" and note our prices

The Benwood Company, Inc.

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Hand rubbed, waxed early English finish. Quartered oak.



PANEL Width	SIZE Height	CABINET DEPTH	
7 1/2"	7"	8"	.....\$3.00
9 1/2"	7"	9"	..... 3.50
7 1/2"	11 1/2"	6 1/2"	..... 3.00
7 1/2"	6"	2"	..... 1.25
7 1/2"	7"	5 1/2"	..... 2.50
18 1/2"	11 1/2"	7"	..... 4.90
11 1/2"	11 1/2"	6 3/4"	..... 4.25
11 1/2"	14"	6 1/2"	..... 5.25
8 3/4"	1 3/4"	4"	..... 1.50
13 1/2"	7"	10"	..... 5.00
9"	9"	6 1/4"	..... 6.75
8"	9"	6 3/4"	..... 5.25
10 1/2"	9"	6 3/4"	..... 5.00
15"	9"	6 3/4"	..... 5.75
14"	9"	6 3/4"	..... 4.00
18 1/2"	9"	6 3/4"	..... 6.25
23"	9"	6 3/4"	..... 7.50
27 1/2"	9"	6 3/4"	..... 9.00
32"	9"	6 3/4"	..... 10.00
8 1/2"	17 1/2"	18 1/4"	..... 7.00
9 1/2"	7"	4 1/4"	
11 3/4"	8"	4 1/4"	with hinged cover.. 3.50
4 1/2"	4 1/2"	1 3/4"	with hinged cover.. 2.00
		90

De Forest Radio Tel. and Tel. Co.

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Cut the High Cost of "B" Batteries Use a "HIPCO"



The ONLY REFILLABLE battery. Tapped every 1.5 volts. New cell can be installed in a few moments.

Battery, POSTPAID\$3.00
Renewal Cell, POSTPAID..... .25

Have a COMPLETE stock of all makes STANDARD apparatus, parts and materials, which can be supplied IMMEDIATELY from stock, all of which is sold at catalogue price.

Motor Generators and Dynamotors
Distributors for the Complete PARAGON Line

The Ray-Di-Co Organization (Ray-Dee-Ko)

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Radio 9AG

Chicago, Ill.

WESTINGHOUSE BROADCASTING STATION

The Westinghouse Electric & Manufacturing Company announces that it has opened a radio telephone broadcasting station at its plant in Newark, N. J., and, with the cooperation of the Newark Sunday Call, is supplying news and concerts which can be heard by wireless operators within a radius of 200 miles. Every night at 8:05, Eastern Standard time, an entertainment consisting of a digest of the day's news, government reports, and a musical entertainment is given. A special feature of the entertainments is a children's hour every Friday night at 7 o'clock, when songs and stories for the youngsters will be radiophoned.

During the world series baseball games every ball, strike and other play was reported as soon as made from this station, so that thousands were able to enjoy the games. Similar service will be provided for the major football games and other important events. The Westinghouse Newark station operates on a wave length of 360 meters and its call letters are WJZ. It should be easily heard as far south as Baltimore and as far north as Albany, while under favorable conditions the messages should be audible in practically the entire area east of the Mississippi river, and as far east as the Bermuda islands.

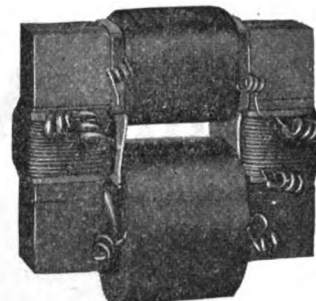
Guaranteed De Forest Parts for C. W. Apparatus Below Cost



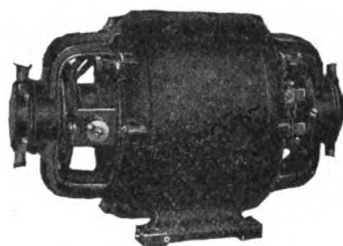
Inductances for transmitters up to 50 watt capacity. 50 turns of wire wound on threaded mica tube. 7 or 26 positive taps. Proper spacing between turns for maximum efficiency. \$8.50.



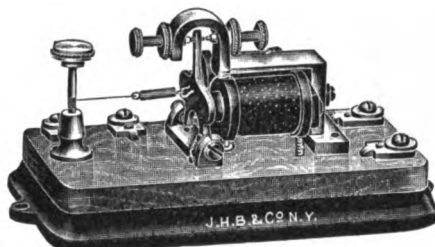
Guaranteed Standard makes of head telephones below cost—
 Murdock No. 55—3000 ohms.....\$4.50
 Federal No. 53W—2200 ohms..... 7.00
 Federal No. 52W—3000 ohms..... 9.50
 Red Head —3000 ohms..... 7.50



Acme C. W. power transform-ers. Unmounted. For 60 cycle, 110 volt supply, 3 secondary windings. 6, 12 and 1000 volts, with center tap on high voltage. Designed to furnish 500 volt D. C. when using standard rectifier tubes. Works efficiently with all makes of tubes. \$12.50.



Guaranteed ESCO dynamometers, 110 volt D. C. to 500 volts D. C., 100 watts. Ball bearing type; one unit. This is the best possible outfit for C. W. plate supply. Smooth running. Noiseless in operation. Large overload factor of safety. Reduced to \$65.00.



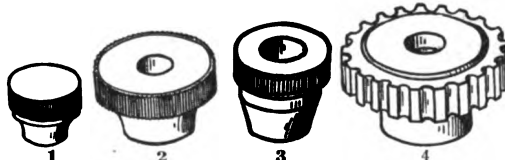
Bunnell relay operating on 6 volt battery. Ideal for electroc-magnetic transfer switch. \$3.98.



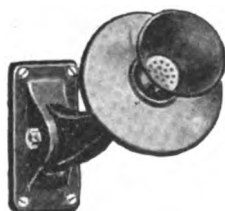
Guaranteed standard indicat-ing instruments at manufactur-er's cost—

Hot Wire Ammeters—General Radio—scale 0-7, \$7.00; Hot Wire Ammeters—General Radio—scale 0-2, \$7.00; High Frequency Ammeters—Roller Smith—scale 0-5, \$22.50; Filament Ammeters—Roller Smith—scale 1.5-0-1.5, \$8.00; W. Filament Ammeters—Weston—scale 6.0-0-1.5, \$9.00; D. C. Ammeters—Splitdorf—scale 0-2, \$5.75; D. C. Ammeters—Splitdorf—scale 0-3, \$5.75; D. C. Ammeters—Splitdorf—scale 0-5, \$5.75; Hot Wire Ammeters—General Radio—scale 0-10, \$7.00; D. C. Milliameters—Splitdorf—scale 0-150, \$5.75; D. C. Milliameters—General Radio—scale 0-250, \$7.00; Filament Ammeters—Amer. Ever-ready—scale 1.5-0-1.5, \$3.80.

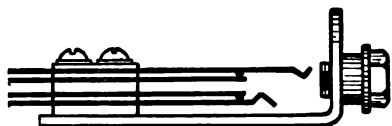
Ward Leonard vitrohm resist-ance units for filament current adjustment and other uses. The best obtainable. Absolutely constant resistances—5 ohms with ferrules, 7 $\frac{1}{2}$ "x $\frac{1}{2}$ ", 90c; 60 ohms, no ferrules, 2"x $\frac{1}{2}$ ", 65c; 90 ohms with ferrules, 2"x $\frac{1}{2}$ ", 75c; 5000 ohms, graphite sectors, 2 $\frac{1}{2}$ "x $\frac{1}{2}$ "x $\frac{1}{4}$ ", for adjustable grid leak resistance, 55c.



Knobs for switches, rheostats, variometers or condensers—
 No. 1, $\frac{3}{4}$ " top diameter, 6c; No. 2, 1 $\frac{1}{4}$ " top diameter, 8c; No. 3, 1 $\frac{1}{2}$ " top diameter, 10c; No. 4, 1 $\frac{1}{2}$ " top diameter, 15c.



Panel type microphone on jap-anned arm ready for mounting. Low resistance. No. 262W. \$4.00.



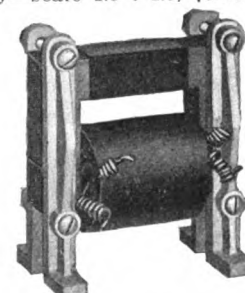
Federal telephone jacks with polished nickle plates, No. 1423W, 90c.

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 At lower cost than imitations

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The mounting bands have been perfected so they are absolutely impervious to moisture; lower distributed capacity, lower high frequency resistance, and better made in all respects than any other coils of this type now on the market.

DL-25	\$1.40	DL-300	\$1.75
DL-35	1.40	DL-400	1.80
DL-60	1.50	DL-500	2.00
DL-75	1.50	DL-600	2.15
DL-100	1.55	DL-750	2.35
DL-150	1.60	DL-1000	2.60
DL-200	1.65	DL-1250	3.00
DL-250	1.70	DL-1500	3.50



Acme A3 modulation transform-ers on mounting brackets. Ex-ceptionally efficient input trans-former for Radio telephone work. \$5.00.



Perfectly insulated control buttons. D. P. D. T.; push locking type, for battery circuits, trans-fer switches, etc. \$1.50.

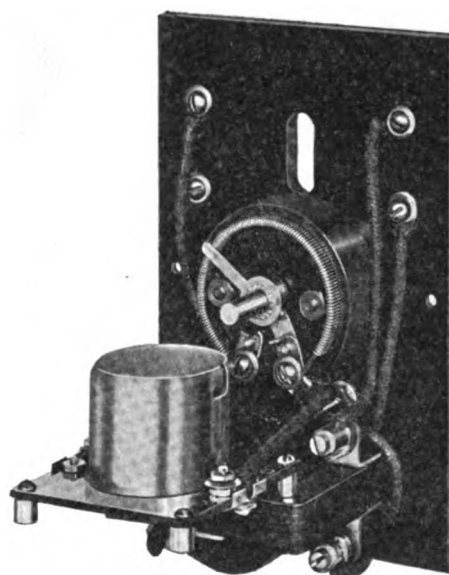
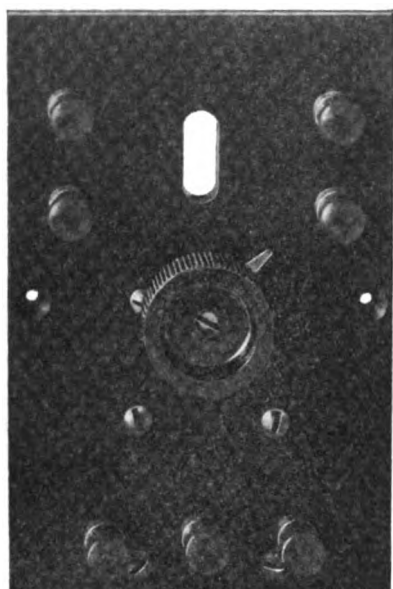
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1391 Sedgwick Avenue, New York, N. Y.

Inventors and Manufacturers of High Grade Radio Apparatus

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Unit Amplifiers and Panels



The most pleasing feature of this Amplifier is its compactness. All the instruments are mounted on the panel, and when mounted in a cabinet the panel is very easily removed, making all parts easily accessible at all times. The Transformers are General Radio make and are designed for the U. V. 202 Radiotron. Tube Sockets are standard, four-prong type. Panel is of well finished XX Bakelite and may be mounted on a base or in a cabinet with other units. Supplied without tubes or batteries. Wiring diagrams accompany each amplifier. AN IDEAL AMPLIFIER.

No. W-609 One stage Amplifier.....	\$15.00	No. W-612 Paragon Rheostat with Bliss Moulded Bakelite Knob	\$ 2.00
No. W-610 One stage Amplifier Panel.....	2.25	No. W-613 Insulated Binding Posts.....	.12
No. W-611 Tube Socket Mounted on back of Transformer	6.25	No. W-614 Complete set of Parts for W-609 Amplifier without wire and connections and not assembled.....	11.34



No. 301 BLISS Improved Switch, as illustration, Edgewise contact type with a genuine molded Bakelite Knob. 1 3/8 in. in diameter with a radius of 1 3/8 inches. Nickel plated lever.....\$.60

No. P-501 BLISS Moulded Bakelite Knob. 1 3/8 inches in diameter. POSTAGE PREPAID\$.30

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*Distributors of Reliable Radio Apparatus to Schools, Colleges, Radio Clubs and Experimenters
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CORPORATION'S PRODUCT ALL
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No. P-2 Amrad, unmounted	3.75
No. QO Clapp-Eastham, semi mounted	4.00

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Bases only	0.50

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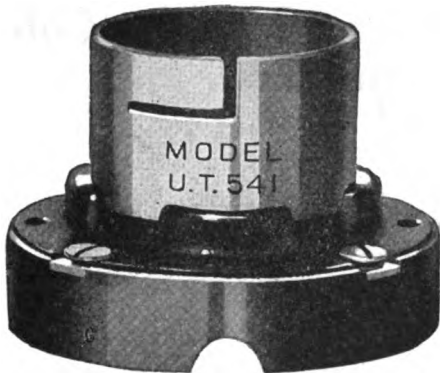
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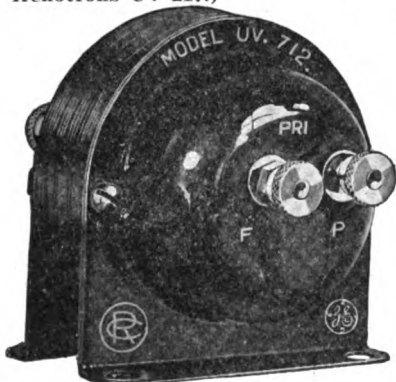
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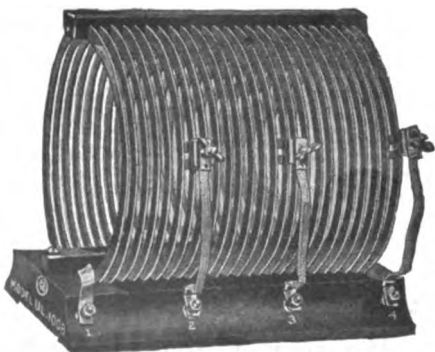


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These sockets have been specially designed to meet the need for a reasonably priced socket which at the same time would be a perfect insulator. Porcelain as used in these sockets has been found to be a perfect insulation.
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(Designed for Radiotrons UV-200, UV-201, UV-202, Kenotrons UV-216.)
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(Designed for Radiotrons UV-203, Kenotrons UV-217.)



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Body is composed of insulating material containing a large percentage of asbestos, making this rheostat fireproof. Special features reduce tube noiseless.

MODEL PR 535.....\$3.00
(Designed for use for Radiotrons UV-200, UV-201, UV-202, Kenotrons UV-216.)
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(Designed for Radiotrons UV-203, UV-204, Kenotrons UV-217.)

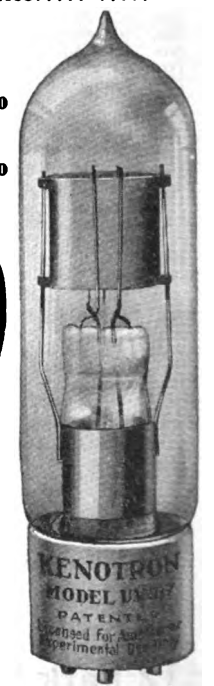
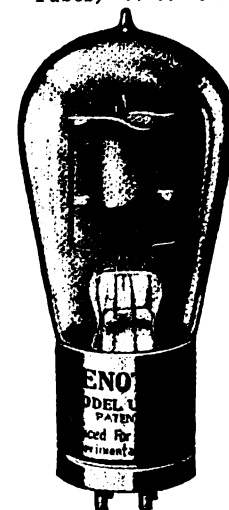


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"Faradon" type condensers, highly efficient for Radiotron transmitting circuits.

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Voltage, 3,000. Price.....\$2.00
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766 Large 22½ Volt B.	3.50
774 Variable 43 Volt B.	5.00
746 Special 106 Volt Amp. B.	16.50
6 Volt 40 Amp. hr. Storage	18.50
6 Volt 60 Amp. hr. Storage	20.50
6 Volt 80 Amp. hr. Storage	24.05
REMLER APPARATUS	
500 Moulded Bakelite Vario-	
meters	6.00
503 Moulded Bakelite Vario-	
couplers	5.40
100 3-in. Bakelite Dial and	
Knob, 3-16 in., or 1-4 in.	1.00
330 Detector Panel Moulded	
Bakelite	8.00
331 Amplifier Panel Less Trans-	
former	6.00
333 Amplifier Panel Less Trans-	
former	9.00
(with cam switch)	
810 Jr. Rheostat	1.00
813 3 Amp. Panel Type Rheostat	1.75
94 A Battery Potentiometer	
Unit	.75
94 Knob and lever for above	.45
96 Variable Grid Leak	.60
97 Fixed Grid Condenser	.35
460 3 Coil Mounting on base	6.50
3 Coil Mountings for Panel	
Mtg.	3.55

QSA INDUCTANCES			
No.	Mounted	Unmounted	
QSA 25	1.40	.50	
" 35	1.40	.50	
" 50	1.50	.60	
" 75	1.50	.60	
" 100	1.55	.65	
" 150	1.60	.70	
" 200	1.65	.75	
" 250	1.70	.80	
" 300	1.75	.85	
" 400	1.80	.90	
" 500	2.00	1.00	
" 600	2.15	1.15	
" 750	2.35	1.35	
" 1000	2.60	1.60	
" 1250	3.00	2.00	
" 1500	3.50	2.50	

JEWEL METERS	
0-100 Milliamps Flush Mtg.	8.00
0-250 Milliamps Flush Mtg.	8.00
0-500 Milliamps Flush Mtg.	8.00
0-500 Volt Meter	16.00
0-1000 Volt Meter	23.00
0-1500 Volt Meter	29.00
0-1, 0-2, 0-2½, 0-5, Thermo coupled Radiation Meter Flush Mtd.	12.00

CW APPARATUS	
Pacnet Universal CW Condensers, any capacity	2.00
CW Tuning Inductance	8.00
Variable Grid Leak 8000 ohm	3.00
Wireless Shop Condenser, .0005	9.00
231M Modulation Transformer	5.00
Kellogg Transmitter	3.50
Kellogg Transmitter, adjustable arm	4.75

TELEPHONES	
Brandes Superior	8.00
Brandes Trans - Atlantic	12.00
Brandes Navy	14.00
Baldwin Type C Navy	13.75

Baldwin Type E	15.00
Baldwin Type F	16.25
Murdoch No. 55 2000 ohm	4.50
Murdoch No. 55 3000 ohm	5.50

JACKS AND PLUGS	
Federal 1421 open Circuit Jack	.70
Federal 1422 single Circuit Jack	.85
Federal 1423 double Circuit Jack	1.00
Federal 1435 automatic Filament Control Jack	1.20
Federal 1438 automatic Filament Control Jack	1.55
Western Electric Plugs	1.30
Federal Plugs	2.00
Pacnet Universal	2.00

SOCKETS	
92 Remler Socket	1.50
156 General Radio	1.50
550 Murdoch	1.00
R300 DeForest	1.60
DeForest Moulded Bakelite	1.40

VARIABLE CONDENSERS	
230 Wireless Shop Panel Mtg.	
.0005	3.60
430 Wireless Shop Panel Mtg.	
.001	5.25
630 Wireless Shop Panel Mtg.	
.0015	7.50
1 Chelsea Mtd. .0006	4.50
2 Chelsea Mtd. .0006	4.50
3 Chelsea Unmtd. .0011	4.50
4 Chelsea Unmtd. .0006	4.60

REGENERATIVE RECEIVERS	
Myco D12 175 to 25000 meters	
Detector 2-step Amp. less	
Coils and Tubes	165.00
CR5 Grebe Regenerative	83.00

MISCELLANEOUS	
Aerial Wire No. 14, hard drawn, 50 feet to the lb., per lb.	.50
Magnavox with new 14-inch horn	45.00
Formica Panels, cut to size, 20 cubic inches to the pound, per pound	2.50

Radio Corporation C. W. Apparatus

KENOTRON RECTIFIERS	
20 watt Kenotron, UV-216	7.50
150 watt Kenotron, UV-217	26.50

VACUUM TUBE SOCKETS	
Bakelite Socket (for UV-200, 201, 202, 216) UP-552	1.50
Mountings (250-watt tube) UT-501, UT-502	2.00

SPECIAL CONDENSERS FOR C. W. SETS	
Antenna Series Condenser, 7500 V, .0003, .0004, .0005 mfd., UC-1015	
Plate and Grid Condenser—3000 V, .002 mfd., UC-1014	

VACUUM TUBE DETECTOR ACCESSORIES	
Intervalve Amplifying Transformer, UV-712	7.00
Special "A" Battery Potentiometer, PR-536	2.00
Grid Leaks, specify resistance	.75
Grid Leak mounting UX-543	.50

POWER TRANSFORMERS FOR C. W. SETS	
325-watt, UP-1368	25.00
750-watt, UP-1016	38.50

C. W. ACCESSORIES	
Oscillation Transformer, UL-1008	11.00
Plate Circuit Reactor, UP-415	5.75
Transmitter Grid Leak (5 watt tubes), 5000 ohms, UP-1719	1.10

Transmitter Grid Leak (50 and 250-watt tubes), 5000 ohms, UP-1718	1.65
Antenna Ammeter, 0-2.5 amp., UM-530	6.60
Antenna Ammeter, 0-5 amp., UM-533	6.25
Sending Key UQ-800	3.00
Microphone Transformer UP-414	7.25
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Filament Rheostat (for UV-203 and 204) PT-537	10.00
Rotary Grid Chopper PX-1638	7.25
Shaft Bushing for ¼ or 5/16 motor shaft	.20

We Carry a Complete Stock of Radio Corporation C. W. Apparatus.

Every Wireless Experimenter should have a copy of our 200-page manual. 35 cents in stamps will bring it to your door, or it will be sent upon the receipt of an order covering \$1.50 purchase.

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Operating the Fairmont Hotel
Radio Station 6XG
San Francisco

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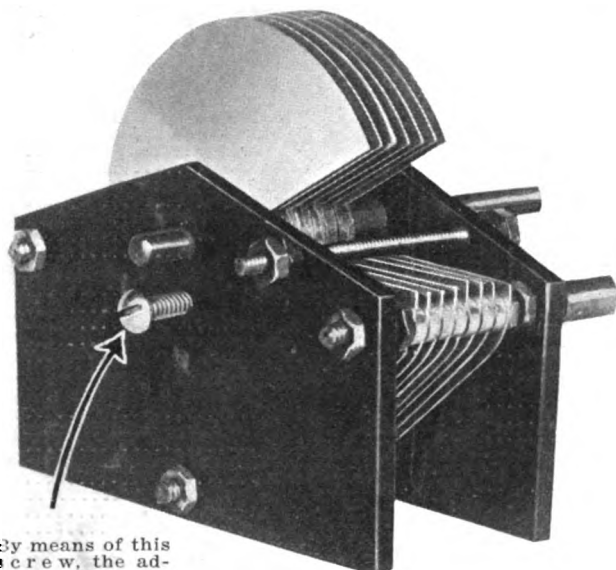
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Operating Hamburger's
Radio Station 6XAK
Los Angeles

SERVICE

Buy your apparatus where you get the service that should go with every piece of equipment you purchase. Buy your apparatus from The Radio Telephone Shop, which has equipment and machinery complete to give every purchaser, no matter where he may live, a full measure of personal service during the entire life of each piece of apparatus he buys.

THE NEW "PEN BRAND" VARIABLE CONDENSER



By means of this screw, the adjustment can be stiffened to prevent the variable plates from slipping after the desired wave length has been secured.

Postpaid to any address in the United States.
Dealers write for proposition.

An Improved Type

This is the new Radio Telephone Shop Series X Variable Condenser, manufactured with a special screw by means of which the adjustment may be tightened to prevent the variable plates slipping after the proper wave length has been secured. Connections can be made either by soldering or with nuts. The plates are die stamped from No. 22 Gauge hard-rolled aluminum, and the entire condenser is of typical "Pen Brand" quality and rugged construction throughout, particular attention being paid in the manufacture to making it sturdy and accurate, so as to give perfect service over a long period of time. Radio Telephone Shop service goes with every one sold, and each one is fully guaranteed. Sizes for every purpose.

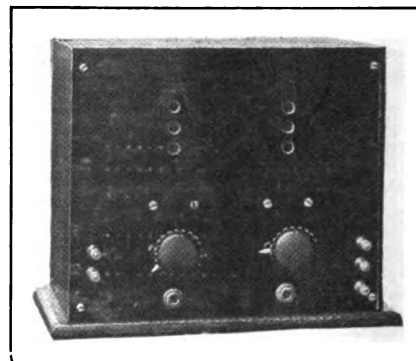
Price: 2 plate, \$2.00; 23 plate, \$3.60; 43 plate, \$5.25. With Pen Brand condensite dial 75c extra

Apparatus made to your order

WE MAKE DIES

The Radio Telephone Shop has recently installed special machinery and complete equipment to make manufacturing dies and handle die stamping work. Manufacturers will save time and money by procuring their dies here. Inventors—we can manufacture your apparatus. Write us for full particulars.

The special two-step amplifier illustrated at the right is a sample of some of the beautiful equipment the Radio Telephone Shop is manufacturing to the buyer's own specifications. If you want a set for some particular use, let us make it to order for you. If you can't buy what you want ready-made, have it made. Don't be satisfied with substitutes. We are completely equipped to make apparatus to order, from the smallest part to the most magnificent and most complete set. Tell us what you have in mind and let us submit a figure.



Of course we also have a complete line of standard equipment, and with every piece of equipment we sell goes the positive Radio Telephone Shop guarantee and the helpful Radio Telephone Shop service during the entire life of the apparatus. If you are not already one of our enthusiastic patrons, get wise. Try us. Get everything you are entitled to at the lowest price, and get it quick. Your regular needs, your special needs, and all your needs will be faithfully filled by—

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RADIO EQUIPMENT

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A. F. PENDLETON,
Manager

DECEMBER 1921. TWENTY CENTS

137

RADIO

Formerly Pacific Radio News



**REMLER
APPARATUS**

FOR A
**RADIO
CHRISTMAS**

RADIO CHRISTMAS NUMBER

Cunningham Tubes Speak for themselves

Amplific
as it
detects



Cunningham
C-300
Gas Content
Detector

\$5.00

Mr. E. T. Cunningham,
248 First St.,
San Francisco, Cal.

Alexis, Ill.

Below are recorded some of the results I have obtained
when using the --- Tubes and though there were
I placed the C-300 in my panel, the first
the lack of "pissing" which one company
point, personally, I never enjoyed it.
noise was a spark--it was clear and
at I had never to spoil the tone,
d to a number heard this station be-
in clear and before that wonderful
test noises.

th and clearness, I placed it in one
nd was surprised to note that it did
I was using despite the difference

reception was above anything I
very critical adjustment, I found
while with the above mentioned about six feet from the phones,
There is a radio-phone station about fifty miles readable.
which I used to listen with the receivers on tight and all the
doors shut. With the C-300 as a detector, I lay the head-phones
on the table and forget all about the set.

I have experimented with a small C. W. outfit and it does
fine on 22-1/2 volts.
I am very sorry that I did not get to communicate with
you sooner but my work here was rather pressing.

At any time you get out new apparatus, will you please
send literature covering it. As you are connected with the
Remler people, will you be kind enough to send their catalog
and prices

Wishing you success, I beg to remain,
Yours very truly,
Frank R. Churchill

Radio 9407



The trade mark
GE is the guaran-
tee of these qual-
ity tubes. Each
tube is built to
most rigid specifi-
cations.

E. T. Cunningham

Trading as

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248 First Street
San Francisco, Calif.

154 West Lake Street
Chicago, Illinois

REMLER APPARATUS RADIATES QUALITY
CUNNINGHAM TUBES MEET EVERY AMATEUR REQUIREMENT

"JUST LISTEN" THE OMNIGRAPH WILL DO THE TEACHING **Learn the Code with the OMNIGRAPH** **AT HOME—in half usual time—Wireless or Morse**

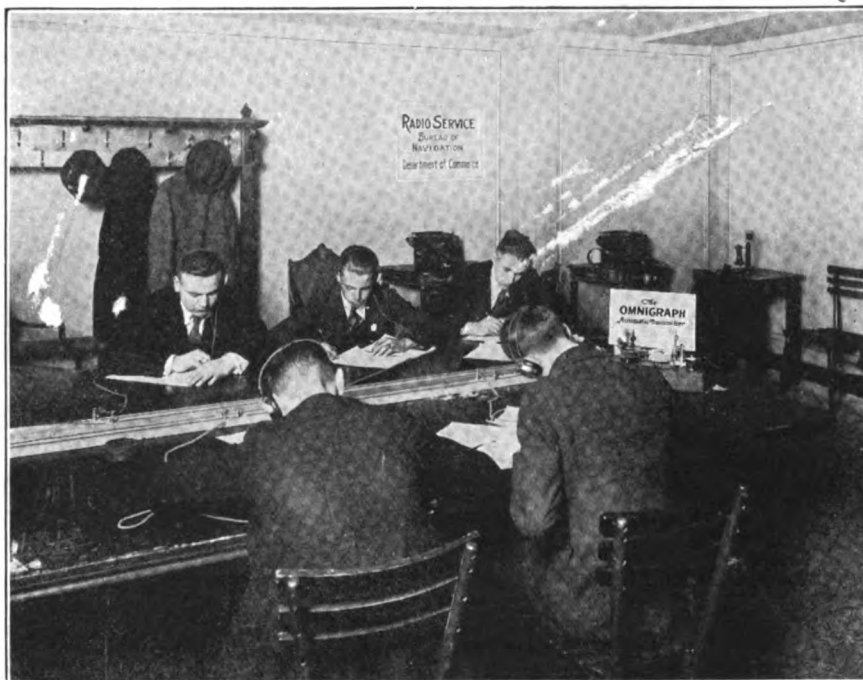
The OMNIGRAPH Automatic Transmitter will teach you either Wireless or Morse Telegraphy—at home—in the shortest possible time and at the least possible expense. Connected with Buzzer and Phone, or with Sounder, the OMNIGRAPH will send you unlimited messages, by the hour, at any speed you desire. It will bring an Expert Operator—right into your home—and will quickly qualify you to pass the examination for a first grade license.

If you should undertake to record on paper tape, all the new messages the OMNIGRAPH will send, you would need a strip long enough to reach around the globe.

**Radio
Convention,
March 16-19,
1921.**

**Hotel
Pennsylvania
Roof,
New York
City.**

**Exhibit of
Dept. of
Commerce,
Bureau of
Navigation.**



**Examina-
tions for
licenses
were given
by the
Dept., every
afternoon
and evening
with the
OMNI-
GRAPH.**

THE OMNIGRAPH is always used to test all applicants applying for a Radio License

The OMNIGRAPH is used by several departments of the U. S. Government and by a large number of the leading Universities, Colleges, Technical and Telegraph Schools throughout the U. S. and Canada.

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Thousands have learned both the Morse and Wireless Codes with the OMNIGRAPH. Send for free Catalog, describing three models—\$14 to \$30—or order direct through any of the following dealers. **DO IT TODAY.** The OMNIGRAPH is sold under the strongest of guarantees—if not as represented, your money back for the asking.

THE OMNIGRAPH MFG. CO., 4341 Richardson Ave.,
New York City, Jan. 21, 1920.

Gentlemen:—I wish briefly to commend your very excellent Automatic Transmitter. Recently I was successful in obtaining a first-class Commercial Radio license and I believe that the Omnigraph was my principal aid. I took a four weeks' course at a Resident Radio School in Theory only. I relied on the Omnigraph to get my Code to the proper speed, and the Omnigraph did it.

I was one of two in a class of eighteen to obtain a first-class License. The stumbling block for the others was CODE. And I know that a short time, receiving Omnigraph messages daily, would have enabled them to pass the examination as easily as I did.

I believe the Omnigraph to be the easiest, quickest and cheapest method to learn the International Morse Code.

Cordially yours,
(Signed) GEO. E. SELLERS.

OMNIGRAPH MFG. CO., 97 Thorne St.,
26 Cortlandt St., Jersey City, N. J.,
New York City, May 6, 1921

Gentlemen:—I am glad to inform you that I secured my First Grade Commercial License on April 25th and as far as passing the code test, I owe most all my success to the Omnigraph. I see no reason for any one to go to a resident school to learn the code, when they can have such a wonderful teacher as the Omnigraph right in their own home. Refer any one to me if you so desire.

Yours truly,
(Signed) CHESTER RACKEY.

THE OMNIGRAPH MFG. CO., Port Aransas, Texas,
May 1, 1921.

Gentlemen:—A few months ago I bought one of your Omnigraphs and I have nothing but praise for it, as it increased my receiving from about five to six words per minute to twenty words in two or three months' time.

Always a Booster for the Omnigraph.
(Signed) CHAS. F. O'DELL.

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Bamberger & Co., L.	Newark, N. J.
Continental Radio & Elec. Corp.	New York City
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California Electric Supply Co.	San Francisco, Calif.
Detroit Elec. Co.	Detroit, Mich.
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Killech Co., David	New York City
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THE OMNIGRAPH MFG. CO.

26 E Cortlandt Ct.,

The Omnigraph Mfg. Co.,
26 E Cortlandt Street
New York City.

Gentlemen:—

As per your ad in Radio please mail me your free catalog of Omnigraphs.

Name

Address

City..... State.....

RADIO

Established 1917 as Pacific Radio News

Volume III

for DECEMBER, 1921

Number 5

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Forecast of Contributions for January Issue

C. W. enthusiasts will welcome the announcement that ENSIGN JENNINGS B. DOW, U. S. S. California, is writing a complete "C. W. Manual," the first chapter of which will appear in these columns next month. The first article will deal with the Vacuum Tube Transmitter Circuit. Succeeding installments will treat of the inherent advantages and disadvantages of C. W. circuits to date, design and construction of five-watt, ten-watt and fifty-watt radio phones for receiving and transmitting, design and construction of a ten-watt and a 250-watt power amplifier, electrolytic and thermionic rectifiers, smoothing out systems, and valuable advice to the experimenter and constructor. This series will also be printed in book form prior to its completion as a serial in RADIO.

A beautifully illustrated account of radio as a preventive of forest-fires may inspire some of our readers with the ambition to operate one of the U. S. Forest Service radio stations next summer, an opportunity for combining pleasure and profit in an ideal radio vacation. The suggestion is pertinent that you urge your Congressman to do his part in securing a continuance of the airplane forest patrol.

The praiseworthy ambition of every amateur to build his own set may be intelligently and efficiently accomplished by following the explicit directions in a series of forthcoming articles by D. B. MCGOWN, assistant radio inspector sixth district. The first article to appear in December will illustrate and describe the construction of a good single coil receiver that will tune up to 2500 or 3000 meters, so as to get everything up to the short wave arcs. Succeeding articles will give directions for home construction of various types of receiving and sending equipment.

Much favorable comment has been received regarding the articles on how and why of radio apparatus by B. F. McNAMEE. The first, published in November Radio, gave a simple account of the theory of radio tuning, and the current issue contains an account of the apparatus and manipulation necessary for good tuning, which will be concluded in December.

'Tis with pleasure that our readers are advised that G. M. BEST of the engineering department of the Pacific Telephone & Telegraph Co., will continue the Radio Question Box, which starts in this issue. Mr. Best is an experienced radio engineer whose answers to any questions that may be propounded can be depended upon for clarity and accuracy. Send your queries to him—care of RADIO.

It's Only a Step for You Now to a Fine Wireless Position

SURELY you have noticed how wireless is spreading over the world like wildfire! Every day you learn of some new field that is utilizing it—some new firm organized to push it forward. Big opportunities are open—and every day get more numerous and attractive. But do you realize that YOU can easily qualify for the wonderful opportunities that are opening? Amateurs—do you know that you can quickly build up your present knowledge of Wireless—and be ready any time you wish for a fine wireless position, either on land or on sea? You are in a fine position to cash in big on this growing field. Right at home you can easily build up your present knowledge and quickly qualify. Through our wonderful Four-Step Home-Study Method a short period of your spare time can be turned into preparation for a worth while future in the fastest growing field in America today—Wireless. You have the whole foundation already to build upon. Our new easy method of instruction makes the rest pure fun, but fun that pays big.

The coupon below will bring you an interesting free booklet—telling about the splendid opportunities open and how you can share them. Mail coupon for booklet today!



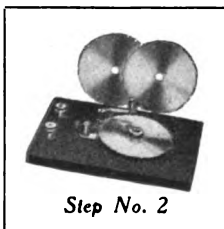
Amazing New Method Makes It Easy to Qualify

From our years of experience in training men for Wireless we have developed the wonderful new Four-Step Method. This method not only includes the comprehensive course of instruction written exclusively for us by some of America's greatest Wireless experts, (members of our own staff), but also includes as part of the course four remarkable inventions. Right in your own home with this amazing system we take you quickly and easily through the four short steps between you and one of the splendid wireless positions waiting for you. These four wonderful inventions make learning like a fascinating game, you learn by actually doing—and you progress so rapidly that many of our students have qualified for fine positions in a few months.

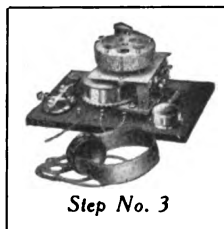
FOUR WONDERFUL INVENTIONS FURNISHED WITH OUR COURSE



Step No. 1



Step No. 2



Step No. 3



Step No. 4

Step No. 1—The Learner's Transmitter—makes learning the code a delightful pastime. With this splendid instrument you get through the fundamentals of wireless almost before you realize it.

Step No. 2—The Learner's Receiver—does away completely with the old trouble of having to have a second person send messages to the student. With the Learner's Receiver the student masters what many consider the most difficult part of wireless in "almost no time."

Step No. 3—The Wonderful Natrometer—perhaps the most important invention ever made for wireless instructional purposes. This amazing machine is designed especially to build up receiving speed. Six hundred different combinations of messages can be sent at speeds varying from five to one hundred

words a minute smoothly, noiselessly and without the slightest bit of "choppiness" by this wonderful machine.

Step No. 4—The Special Westinghouse Receiving Set—completes your training into a high-paid wireless expert. This is a real receiving instrument and will enable you to "listen in" on the world. This splendid device gives you the practical

experience of actually taking messages "out of the air."

Our special short-cut course is built around the use of these four wonderful inventions. No matter whether you know a thing about electricity at the present time, this wonderful Four-Step Method will qual-

ify you quickly and easily for the splendid opportunities open for you in Wireless. No wonder our students learn so rapidly—hundreds of them are making good in all parts of the world today. You owe it to yourself not to let this really once-in-a-lifetime-chance slip by. With the experience you have already had as an amateur you should qualify in a very short time through this new easy way to learn.

Big Opportunities in Wireless

Radio provides you with a valuable training and gives you a trade that will last you a lifetime. As a radio operator you save big money right from the start. It is nothing uncommon for radio men to save \$1,000 the first year they work—and why not? All expenses are paid in addition to salary, and he has plenty of time to prepare for the higher-up positions, (Radio-Engineer, etc.) paying \$6,000 to \$10,000 a year. Think of it! Are you going to let this great opportunity slip by?

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3. Our Diploma Given Government Credit and Recognition.
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Mail coupon today for our free illustrated booklet, "Wireless—The Opportunity of Today." Without cost or obligation we want to tell you more about this field, its big opportunities both on land and sea and just how our new method quickly qualifies you. We want to let you read some of the wonderful stories of our students, told in their own words. How, through this wonderful Four-Step Method they quickly and easily qualified for wireless. How they are holding down fine positions in all parts of the world, earning big salaries, saving money, leading a wonderful life of freedom.—And we want to tell you how you can follow in their footsteps and win just as great or greater success. Don't hold back, wireless is calling you NOW! Send off the

coupon now for this interesting book. No agent will call upon you. We just want to send you the facts. Mail the coupon at once!

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Send me your free booklet, "Wireless—the Opportunity of Today." Tell me about the opportunities open in wireless, about your institute and your offer.

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Age.....

Address.....

City.....

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() I am interested in a sea position.
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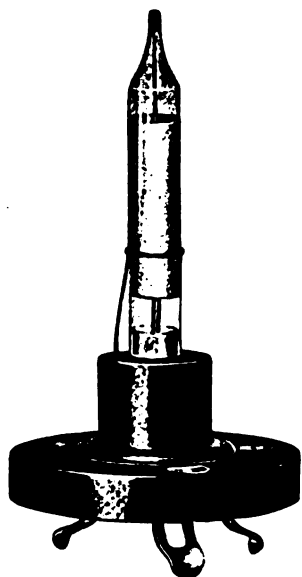
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The New Electron Tube *Detector and Self Amplifier*

(Fully protected by patents in the principal countries throughout the world)



This Tube, the Sensation of the Chicago Radio Show, is new in principle and in operation. Hence it offers these notable advantages:

No B Batteries
No Tickler
No Grid Leaks
No Filament Adjustment
High Selectivity
Extreme Sensitiveness
(Equal to one stage of amplification)

Much Longer Life
Uniformity of Tubes
(All equally good)

It represents the result of over four years' exhaustive research, the study of nearly 2000 tubes, with complete records of the characteristics of each one. It has had thorough tests in our own research laboratories, and months of continuous operating use.

Only after gaining this full knowledge of its characteristics, its remarkable possibilities, and its practical usefulness, are we ready to offer it to radio workers as a forward step in a great field.

Made up in the complete CONNECTICUT Detector Set at \$35.00; Detector Unit alone, \$12.00; Tubes (for replacement), \$3.50.

We shall be glad to furnish you with further information on request. Or ask your dealer to show you the set.

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RADIO

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DECEMBER, 1921

Per Copy 20 Cents

Radiatorial Comment

THE usual formula of this festive season is: "A VERY MERRY CHRISTMAS!" It looks stereotyped, and it is, we admit, strenuously overworked each year, but beneath the printed words lies all the depth of human friendship and fellowship that we possess—and that we extend to you right gladly and with fulsome cheer.

We think of you, not merely as subscribers, contributors and advertisers, but rather as co-workers, whose vast store-houses of energy are being expended along the lines of progress.

Progress! Magic term! And because of American youth and manhood, their devotion to it, this great nation of ours lights the way for the world.

It is a wonderful thing to be an American!

Have you ever given that a thought?

From the point of view of the ages of nations, we are 145 years young! But in that time we have reached—and passed—the rest.

We do not write these lines in a spirit of egotism. Rather are they set down as a spur, that we—and by "we" I have reference to the vast body of American amateur radio operators—may not forget the little tale of the tortoise and the hare!

ON THIS page is a message from President Harding to the amateur radio enthusiasts, that we are indeed honored by having been given the great privilege of publishing.

We would ask that the amateur fraternity read the conveyed words of the President—carefully:

"The splendid work done by the amateur radio operators during the World War is fully appreciated by the President, and he would be glad to help in any way to encourage the further study of this science."

Portentuous words—these!

The splendid promise of a splendid man to encourage amateur radio efforts.

The body aggregate of amateurs would be stupid indeed, were they not to take heed and forge ahead.

President Harding did not reach unto the position of the nation's Chief Executive at a sudden bound. His years of public life, and more especially his years of experience in the U. S. Senate, have given him a passingly shrewd cognizance of the affairs of the world, that are, alas, in a sadly tangled condition, and he knows, full well, the telling value of Preparedness.

God wot, we have had enough of wars—we, a world of human beings that flatter ourselves that it is "civilized!" But the fact remains that the milk of human kindness, as between nations, is not overflowing to any marked degree. The fact remains that overwhelming strength in every branch of every service in the nation's defense and offence, is—par excellence—the only road that leads to Peace. The immortal Roosevelt summed the situation neatly when he said: "Be so thunderin' strong that no one will want to start anything!"

The amateur radio operators of the U. S. hold it in the palms of their hands to be of inestimable service to the President, in his capacity of Commander-in-Chief of the Army and Navy, as members of the Signal Corps Reserve.

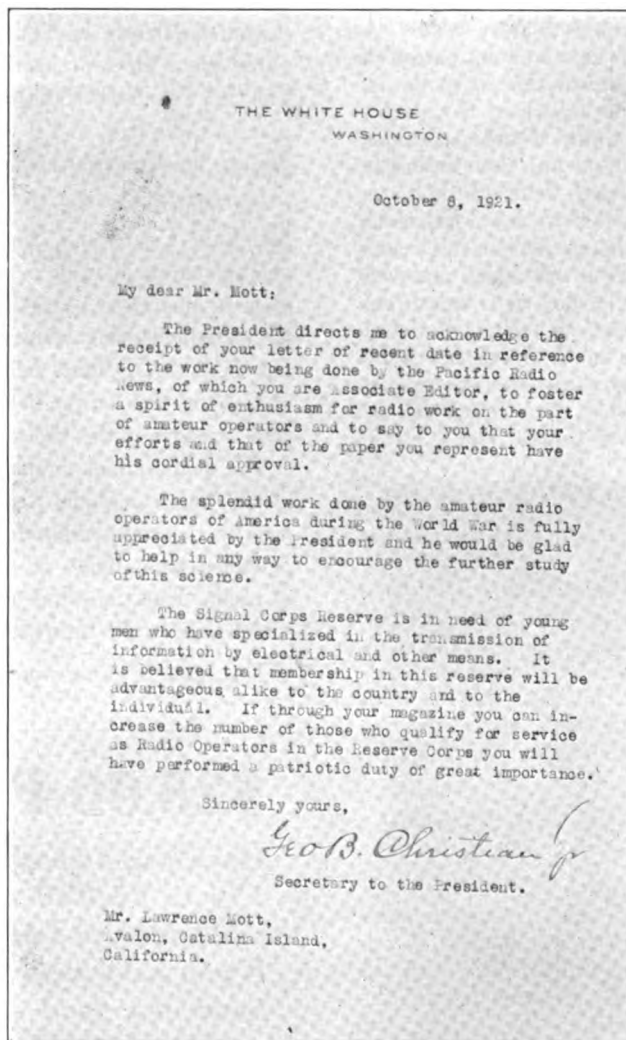
Says the President:

"The Signal Corps Reserve is in need of young men who have specialized in the transmission

of information by electrical and other means. It is believed that membership in this reserve will be advantageous alike to the country and to the individual."

This is President Harding's message. Could anything be more clear?

We think not.



And we ask that when it is possible to register at the proper places—to be later announced in these pages—for enrollment with the Signal Corps Reserve, that every amateur operator, of eligible age, and with sufficient knowledge, step forward one pace.

We further ask that those whose knowledge is a bit backward, bestir themselves and "make good."

We ask that the American amateur radio operators of the Pacific Coast work hard, seriously, continuously, during the coming year. We ask that the traffic managers of the ARRL be rendered every assistance in order that the Pacific Coast records for traffic successfully handled may prove that the operators out here are not a heedless lot of youth, but rather that they are men, of serious intent. We ask forbearance, one toward another; a little less jamming of the night airs with useless chatter. We ask that the Federal laws be obeyed.

And finally we ask that which we again extend to you—Friendship, Good Fellowship, Loyalty.

We ask these things, that his faith in amateur radio, the praise that the President has so generously bestowed upon it, and his recognition of its great potential value, may not be all in vain.

LAWRENCE MOTT.

WITH thanks do the publishers of Radio publicly acknowledge the receipt of congratulatory letters too numerous to be individually answered in person if every ounce of effort and every minute of time is to be devoted to making RADIO the best in America. We deeply appreciate these many expressions of approval and encouragement and can only say that we will do our best to justify them in the future by trying to make each issue a little better than its predecessor. To help us in this work we ask each reader to write us what he likes and what he dislikes in December RADIO what features he would like to see added and what departments dropped. And especially do we request our readers to send in radio questions so that our technical adviser, Mr. Gerald Best, may be enabled to make a success of his Question Box. Without questions no answers can qualify.

TOO much credit can not be given the generous and spontaneous action of the members of the Bay Counties Radio Club of Oakland, California, in agreeing to stay off the air while the radio concerts are being broadcasted nightly. This graceful recognition of the privilege of others to listen in to the musical treats that are now available to thousands shows that a radio fan can be a gentleman notwithstanding his eager desire to perfect his "fist" and teach his "ear." As a result many more people will put in receiving sets and the day hastened when no home will be complete without its radio.

RELATED, but none the less hearty welcome is herein given to Citizen Radio, the new name that now dignifies the amateur operator. But while such nominal recognition is due this praiseworthy effort to find for radio its place in the sun, we should not thereby forget the wonderful associations that cluster round the name "amateur." Literally and originally "a lover," amateur implies not the novice nor the inexperienced, but rather the doing well of those things which we like to do. And greatly is it to be desired as radio outgrows its swaddling clothes and assumes the responsibilities of maturity, that still may its devotees continue to play the game for the pure love of it. May the Citizen never forget to play the lover!

WE READ in the early records of the West that the Argonauts, finding a country without law and order, governed themselves by certain customs that now live and are enforced as the law of western water. So likewise have the pioneers in radio, finding the existing laws to be inadequate, mutually agreed upon certain rules of the air as traffic regulations. But the laws of the air, unlike those of water, have not yet been codified. The art is too young. Experience is showing that these tacitly accepted early customs are still inadequate to cope with the radio outlaw and to protect the majority.

So RADIO hereby extends an invitation to all of the radio clubs west of the Rockies to send representatives to a great meeting to be held at San Francisco on January 1, 1922, in order to devise some more effective means of regulating the traffic. Then and there will be given the opportunity to draft a "Pacific Plan,"—Pacific not alone territorially, but also because of its peaceful significance.

The suggestion is ours, but the action is yours, Oh Citizen Radiory of the West! Lay aside petty differences, forget past quarrels and get together in solemn council so as to bring out of the present chaos of the ether an order that may be respected and obeyed.

Your hosts will be the radio clubs of the San Francisco Bay district. Already have they anticipated this notice and prepared great pipes of peace and foaming beakers of balm. The San Francisco Radio Club has reserved a convention hall, plans a radio ball, and is arranging a radio show. New Year's Eve in San Francisco! Oh boy! Oh joy!

Let Vancouver, Seattle, Tacoma, Portland, Spokane, Butte, Salt Lake City, Reno, San Diego, Los Angeles, and all intervening centers of radio activity select of their best to represent them at this great peace conference. Let each club, through its accredited delegate, present its carefully formulated ideas. Let these various ideas be tested in the fiery furnace of discussion. And then let the best of them be welded into a complete ideal to govern the radio operator during the year to come.

The deliberations might well be guided by the general rules of the American Radio Relay League, which can be adapted to meet the special conditions peculiar to the West. They can be amended annually so as to keep pace with the rapid growth of radio. Thus, and thus only can be established that harmony so essential to the future advancement of radio.

The value of these words rests in their personal application.

\$25.00 Prize Contest

Have you a receiving set that tunes from 175 to 25,000 meters and regenerates, oscillates and detects over its entire range? If you have such a set, tell us all about it. Send in a good sketch of the circuit, the entire constructional details and enter the race for a prize of \$25.00 in gold for the best manuscript submitted. The contest closes on December fifteenth.

The Catalina-Long Beach Radio Telephone Link



Radio Station at Pebbly Beach, Catalina Island.

BY MEANS of a 30-mile radio link between the coast of Southern California and Catalina Island, it is possible for a telephone subscriber anywhere on the lines of the Bell telephone system to call any subscriber on the island by telephone. Now that a year's operation has demonstrated the success of this combined wire and wireless service, it seems desirable to give some of the details whereby this remarkable event has been achieved. For a full account the reader is referred to a paper by L. M. Clement, F. M. Ryan and D. K. Martin, which will appear in the Proceedings of the Institute of Radio Engineers. The following material has been rewritten from an advance copy of this paper:

Communication is accomplished by means of a 23-mile wire circuit from the Los Angeles exchange to Long Beach, a 31.5-mile radio link from Long Beach to Pebbly Beach on Catalina Island, and 1.2-mile wire circuit from Pebbly Beach to Avalon, the principal settlement on the island. This circuit is pictorially shown in Fig. 1. The radio circuit is operated in duplex, it being possible to send and receive at the same time from each station. Furthermore radio telegraph

messages are sent while telephone conversations are being carried on without mutual interference.

There were two methods available for establishing telephone service to the island, either by submarine cable or by radio; and, inasmuch as the time element and first cost were determining factors, the radio telephone was selected by the engineers of the American Telephone & Telegraph Co. as the best solution of the problem. Although the decision to employ radio was reached late in May, 1920, the system was in regular operation by the following July, this rapid installation being made possible through the co-operation of the manufacturing department of the Western Electric Company and the engineering and construction department of the Pacific Telephone & Telegraph Company.

The two principle requirements of the radio equipment were duplex operation and efficient connection to the ordinary two-wire telephone circuits. The first requirement was met by making use of the principle of selectivity, i.e., different wave lengths are used for transmission in opposite directions. After a careful survey and study of the interference from nearby radio stations a wave length of 470 meters was selected for the Long Beach radio transmitter and 400 meters for the Pebbly Beach radio transmitter.

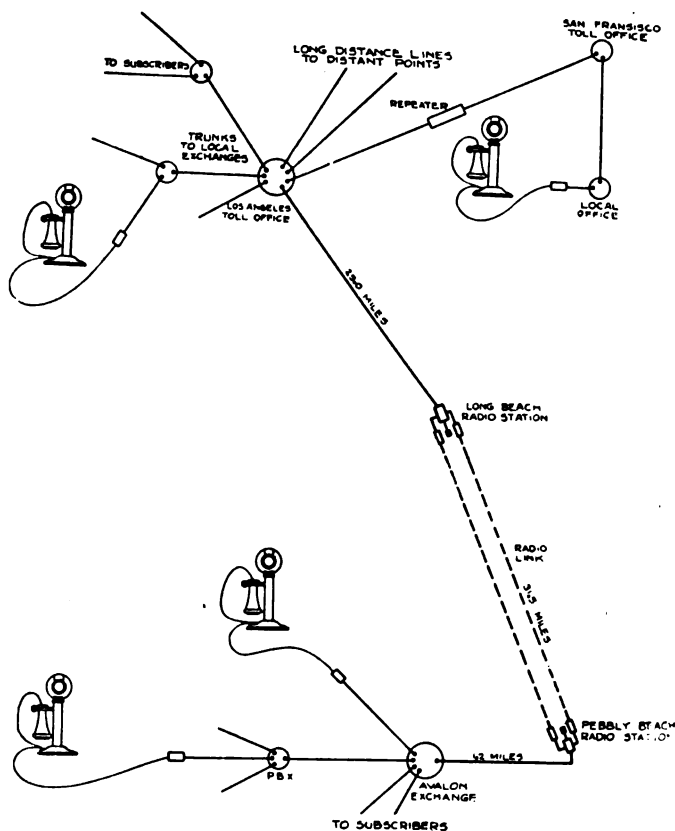
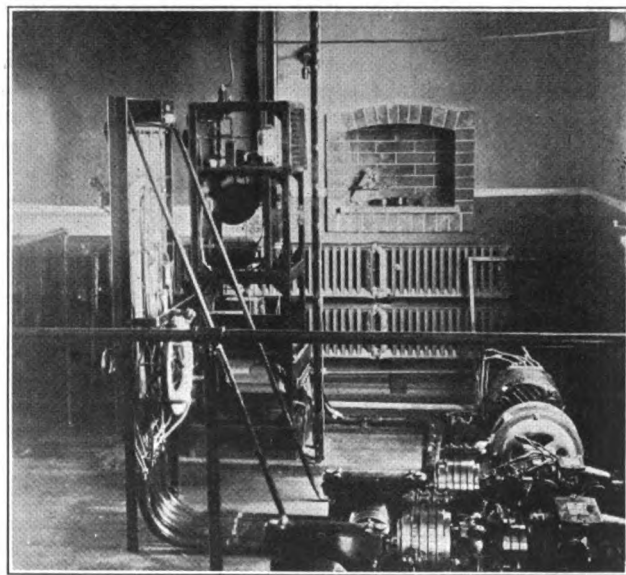


Fig. 1. Pictorial Diagram of Avalon-Los Angeles Circuit.



Rear View of Transmitter Power Panel, and Motor Generator at Long Beach.

The problem of combining a sending and receiving channel into a single duplex channel had already presented itself in ordinary telephone repeater practice; and the same method of combining the two channels into a single channel was adopted

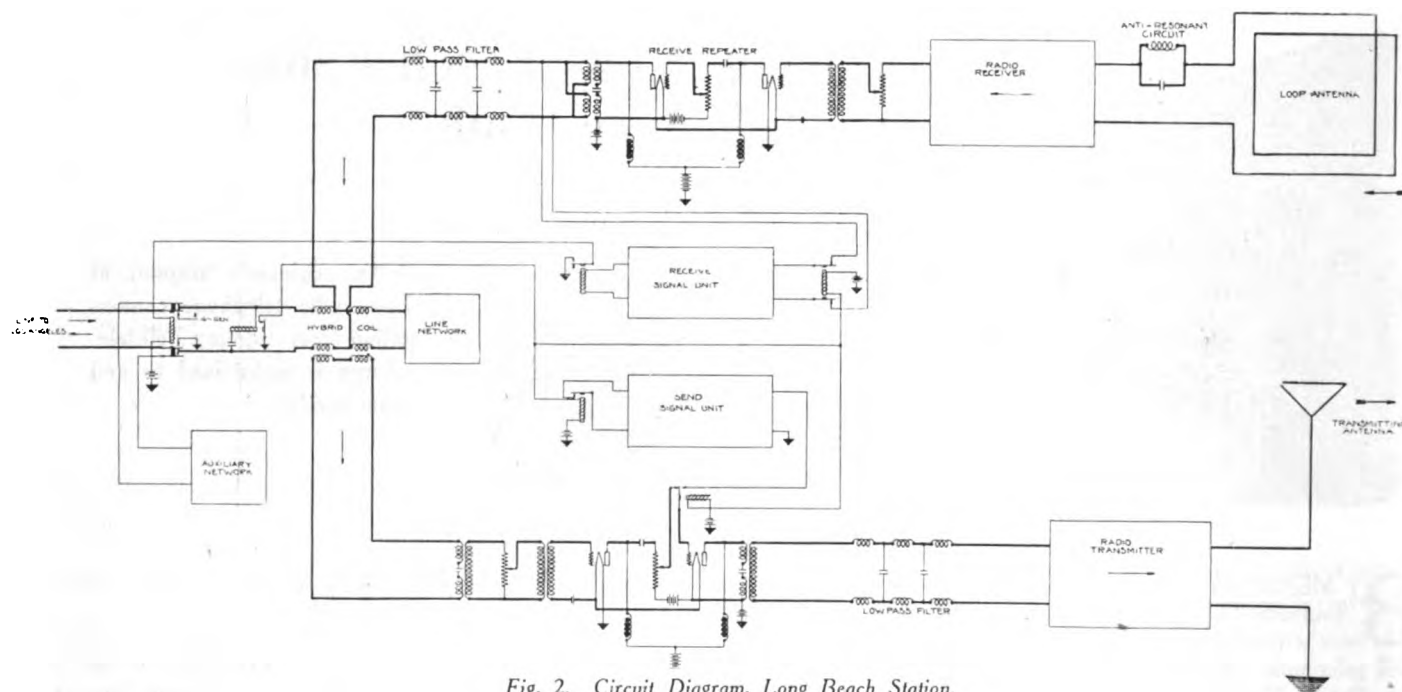


Fig. 2. Circuit Diagram, Long Beach Station.

in this case by using a three-winding transformer or hybrid coil, as it is called. This met the second requirement of efficient connection between the radio link and the wire lines.

Fig. 2 shows how the radio circuit is linked with the wire circuit. The heavy lines in this figure show the speech circuit, and the light lines the signaling system. For simplicity only the principal connections are shown.

Speech currents received from the Los Angeles line pass through the cordless switchboard to the hybrid coil and to the network inducing similar currents in the input winding connected to the send repeater. This repeater amplifies these speech currents and delivers them to a low-pass filter which freely passes the principal speech frequencies of from 200 to 2000 cycles, but greatly attenuates currents of frequencies higher than 2200 cycles. Experiments have shown that only the band of frequencies from 200 to 2000 cycles need be transmitted to deliver commercial quality and readily understandable speech, and therefore the use of this filter does not impair to any appreciable extent the quality of transmission. The filter serves two purposes: it prevents interfering currents of frequencies above the necessary speech range from entering the radio transmitter, and it makes the balancing of the line with a suitable network somewhat easier in that the balance

must be effective only for frequencies below 2200 cycles. The output currents from the filter are delivered to the radio transmitter where they are further amplified and employed to modulate the radio frequency carrier current there generated.

The cordless switchboard provides convenient means for testing and monitoring on the circuit and for connecting quickly with another wire line in case of trouble in the wire portion of the circuit.

Referring to Fig. 3, the speech current is applied to the speech amplifier tube, E, through the input transformer T₁. The output of this amplifier is impressed on the grid circuits of the two parallel modulator tubes through the transformer T₂. The action of these modulator tubes is that of an amplifier and their output voltage is impressed on the plate circuits of the two oscillator tubes by means of the reactance L₂, which is common to the modulator and oscillator plate circuits. This modulation of the oscillator plate potential results in speech frequency variation of the amplitude of the antenna current.

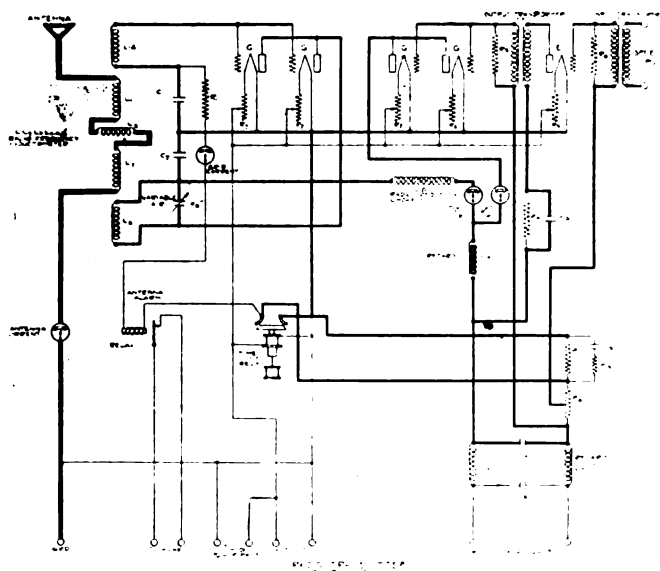
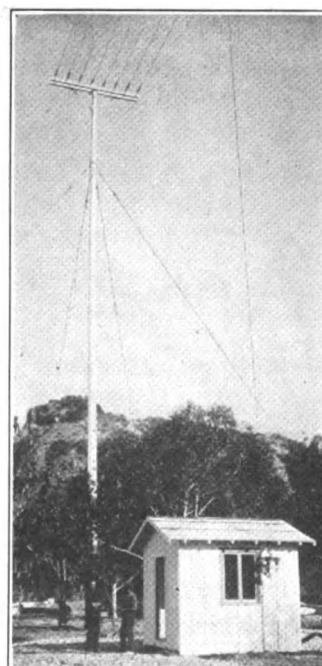
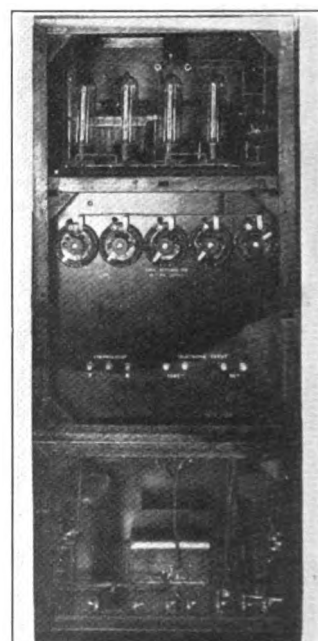


Fig. 3. Circuit Diagram of Radio Transmitter.



Antenna and Transmitter House.



Rear View of Radio Transmitter.

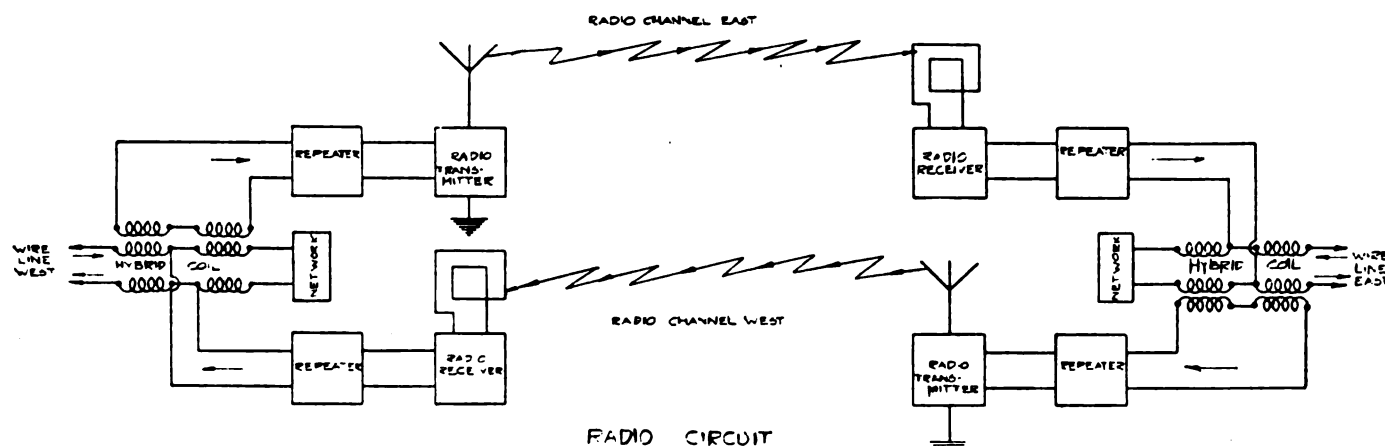
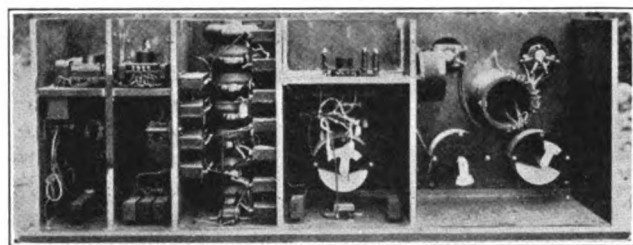


Fig. 4. Receiving and Transmitting Circuits.

Direct current supply from a.c. mains is obtained from a motor generator set consisting of an induction motor which drives two ECK generators, one 12-volt and the other 1000-volt. The low voltage supply heats the tube filaments and the high voltage furnishes the currents.

As may be noted from Fig. 3 the 1000-volt circuit includes



Rear View of Receiving Set.

a filter made up of the series retard coils L_1 and the shunt condensers C_1 , which smooth out any commutator ripple or other machine noises and protect the generator from the radio frequency potentials.

Negative grid potential for the speech amplifier E is maintained from the drop in potential in the upper part of the resistance R_1 and for the modulator tube from the entire drop in this resistance, which carries the space current of all tubes in the transmitter set.

The 12-volt filament circuit controls the time limit relay which controls the auxiliary negative grid potential resulting from the drop of potential in R_{10} . This negative potential is large enough to stop oscillations and to minimize space currents. The filaments thus reduce to normal temperature before the auxiliary grid potential is removed, which prevents excessive space currents while the filament is heating. The oscillator grid circuit stops flowing whenever the oscillations cease in the antenna circuit, releasing a relay which actuates an alarm at the switchboard.

A loop antenna is used for receiving, it being of the solenoidal type 6 feet square with five turns.

In order to prevent, as far as possible, currents of the transmitting frequencies entering the receiver, an anti-resonant circuit adjusted to have a maximum impedance at the transmitting carrier frequency is included in the loop circuit and forms an effective filter.

Fig. 4 clearly shows the entire receiving circuit as associated with the radio transmitter, and also shows the signalling circuit, the diagram in itself being self explanatory. The heavy lines in the drawing show the speech circuit and the light lines the signalling system. Current for the operation of the receiving apparatus is supplied by storage batteries and by dry batteries as in the usual amateur set.

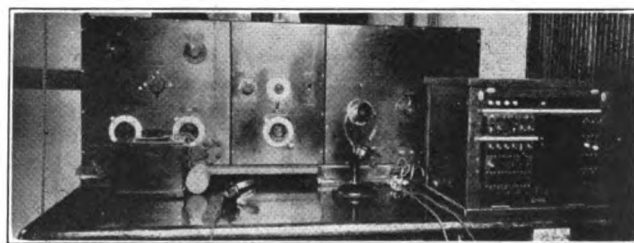
One of the most novel features of the installation is the fact that the subscriber is called in the usual manner by the switchboard operator after the operator has been "rung" by

means of a signal which not only passes over the radio link but is automatically relayed at the junction with the wire circuit. The operator at the sending station merely throws the usual ringing key and a light appears or a buzzer sounds at the receiving toll board.

As shown in Fig. 4 this is accomplished through a series of relays actuated by the usual 16-cycle ringing current from the line wire, these relays being connected to the sending or receiving tubes.

The transmitting aerial at Pebbly Beach and Long Beach are each supported by 90 foot poles 107 feet apart, firmly set on concrete and I-beam footing so as to get the full effective height of the masts. The antennae are of the T type and consist of eight wires spaced 2 feet apart and supported by double cross arms bolted to the pole and reinforced by a channel iron truss, making for great rigidity and minimizing any change of frequency due to the swinging of the wires. This construction is clearly shown in the accompanying illustration. The antenna wire is 7-strand No. 18 silicon bronze. All joints are made with copper sleeves. A lead-in of 1/4 inch copper sash-cord is connected to the antenna wires at their center. Each wire is fastened to a long eye-bolt passing through both cross arms and secured with lock nuts, thus allowing the tension of each individual wire to be regulated without affecting the tension of the other wires. Four porcelain strain insulators in series insulate each wire from the cross arms.

Grounding at Pebbly Beach is accomplished by wires run radially from the transmitter for a distance of 250 feet and buried in the ground to a depth of 8 inches. All surrounding conduits and water pipes are thoroughly connected with each



Front View of Receiving Set.

other, copper strips are buried in moist earth and thus is secured an effective low resistance net work.

At Long Beach, besides the office ground, copper strips are buried at the bottom of a 34-foot well which was filled up with junk copper, coke and earth; in addition all surrounding pipe and metal were thoroughly grounded.

It is of interest to note that not a single conversation has been interrupted by static, although the line has been "noisy" during electrical storms. The station radiates a pure sharp wave and any interference with nearby stations is easily eliminated by anti-resonant circuits.

The Handling of Tuning Apparatus

By B. F. McNamee.

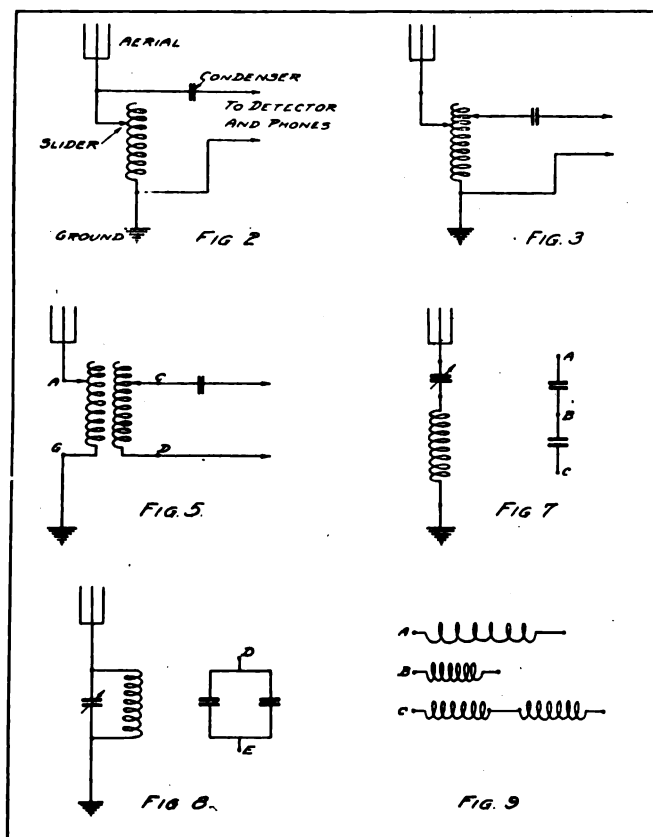
AN OLD style tuning coil consists of a single layer of copper wire wound on a tube made of some insulating material. The turns do not touch each other, being separated by insulation or by being wound in a groove. A slider makes contact with the wire, so that one can use any desired number of turns. By using the connections shown in Figs. 2 or 3, such a coil may be used for tuning to transmitting stations on various wave lengths by simply adjusting the position of the slider.

In studying the action of tuning apparatus we are repeatedly confronted with the terms "inductance" and "capacity." A short explanation is therefore in order.

Whenever an electric current flows there is magnetism set up in the space surrounding the conductor. To demonstrate this one has but to observe the deflection of the needle of a

able with respect to the other, we have the ordinary form of variable condenser, as shown in Fig. 6. The capacity of such a condenser can be changed by simply turning the knob, which controls the movable plates.

Just as the frequency of a pendulum may be changed by changing its length, the frequency (or wave length) of an electric circuit is changed by varying its inductance or its capacity. In the circuit shown in Fig. 2 the main inductance is the coil, and the main capacity is the aerial. It is easily seen that the aerial and ground form the two plates of a condenser with the air between them as the insulator. As it is



compass when brought under a trolley wire. The property which an electric circuit has of storing energy in the form of magnetism is called the inductance of the circuit. While a straight wire of given length has a certain amount of inductance, the same length of wire wound into a coil has many times that amount of inductance.

Before a lightning discharge takes place there must be a storing of energy in the cloud in the form of static electricity.

The property which the cloud has of storing electrostatic energy is called its capacity. This capacity of the cloud is greater because of its nearness to the earth than it would be if far removed from all conducting bodies. The cloud and the earth taken together with the non-conducting air between them form what is termed a condenser. A condenser consists of two conductors separated by an insulator, and usually takes the form of two metal plates separated by some insulating substance, such as glass or air. When a condenser is constructed of two sets of metal plates, in which one set is mov-

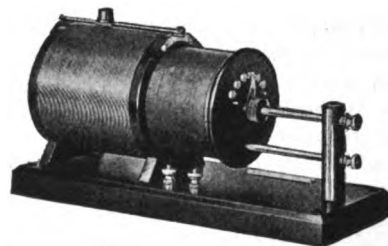


Fig. 4. Loose Coupler.

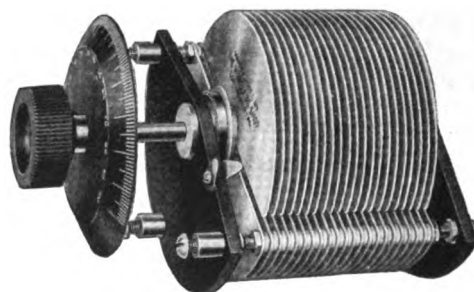


Fig. 6. Variable Condenser.

difficult to vary the capacity in this circuit, the tuning is done by running the slider along the coil, thus varying the inductance.

Fig. 3 shows the two-slide tuning coil which permits the detector circuit to be tuned as well as the aerial circuit. This circuit will give louder signals than that of Fig. 2, because the tuned detector circuit will supply more energy to the detector.

Fig. 4 shows the ordinary type of loose coupler, the circuit of which is shown in Fig. 5. The two coils are generally arranged telescope fashion, with one of them free to move with respect to the other. One of the coils form the main inductance in the antenna circuit, and is known as the primary, while the other, known as the secondary, is the main inductance in the detector circuit. The action is the same as in an ordinary transformer. The magnetic effect of the current in one coil sets up a corresponding current in the other if the latter is tuned to the wave length in question. We therefore have two distinct circuits which must be both tuned to the incoming signal before it will be picked up, except in cases where we are very close to an extremely powerful station. While the loose coupler involves more adjustment than the tuning coil, it provides for much greater freedom from interference. A variable condenser is usually connected between points C and D to assist in tuning the secondary circuit.

It is a common and serious mistake to think of the two circuits of a loose coupler as entirely independent of each other when it comes to tuning. The presence of each circuit changes the amount of inductance in the coil of the other circuit, and the closer the two coils are placed, the greater is this effect. Consequently if we tune in a signal with the coils

For Consideration by the Secretary of the Navy

By Lawrence Mott, Associate Editor.

LET it not be thought that in this article I venture to criticize the Navy Department—as such, indeed, is far removed from my intent—which is to call the attention of the Honorable Secretary of the Navy to certain facts. And this for the reason that it is seldom that the Man at the Top knows o'erly much anent "doings" many rungs lower down on the Official Ladder!

I reproduce part of a communication received by me from one of the foremost amateur operators in Southern California, a man of mature age and dignified profession, whose hobby is research and experimental work in radio effort. Only in the fact that he does not transmit messages for financial considerations is he different from Class A-1 Commercial Operators—and I make so bold as to state that he has forgot more about radio than the average commercial operator knows—today!

Hence his letter is very much worth while considering!

"... Something should be done about these arcs. It seems unjust that the Naval Stations should be permitted to use a transmitter that upsets all traffic within 100 miles. Their own engineers have counted over 60 harmonics. The foolish part of it is that it not only upsets all commercial and amateur stations within the above distance, but the Navy spark station, itself, has the greatest difficulty in reading, sometimes faring much worse than the amateur stations.

"There must be some politics, somewhere, or else much gross negligence and inefficiency! It is too bad that some of the real engineers, interested in the location of some of the government radio stations, have not been listened to—at Washington. This arc station, here at San Diego, has no natural ground! It was placed where it is because of a fancied protection, yet its visibility is relatively just as great where it is, as had it been put in False Bay—where a really efficient ground system could easily have been obtained. The arc is the most discouraging single element here, completely wiping out as it does, decent reception most of the time."

All this is a sheer waste of men's time, of the Government's apparatus, etc. And it could all be efficiently remedied, were investigations—and their resultant changes—made.

I am informed that these conditions exist, to a large extent, wherever a Naval Station is situate.

WHY? Ah! there's the rub o' it!

Radio communication is rapidly becoming one of the chiefest arteries of the nation's means of communication. Should a state of war exist, it would be the artery. Why not—while the Dove of Peace—poor, harassed bird!—seeks a hit-or-miss roosting place on American soil, and timidly utters a plaintive coo-coo—why not look into the matter of faultily-built Naval Stations, and correct mistakes? Mistakes that—although doubtless made in good faith—might prove to be very expensive—especially on the Pacific Coast.

No one censures an honest mistake. But they are fools, indeed, that seek to "hush up" mistakes—and trust to "getting by" with them.

RADIO holds no "special license" to censure, to criticize or to publish articles that are derogatory to the dignity and prestige of the Government of the United States. Or that reflect adversely on any Department in the Government. The Editors take a very great deal of pride in trying to further certain plans of the War Department—for more efficient radio among civilians.

BUT the Editors also feel that it were a mistake—in the wrong direction—not to call the attention of the Honorable Secretary of the Navy to certain, inexcusable weaknesses in the nation's most sensitive and critical arm of defense: its means of radio communication on the Pacific Coast.

"loosely coupled" and then separate the coils somewhat, the signal will become weak or disappear, because it is now de-

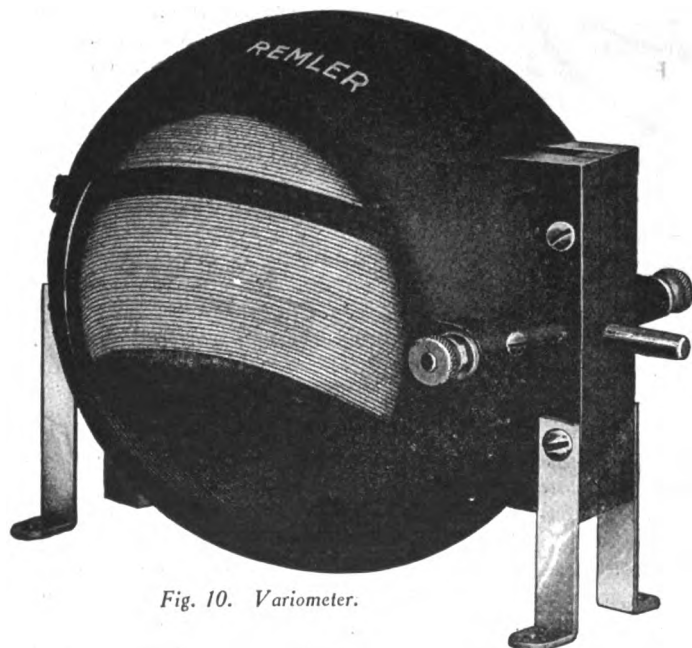


Fig. 10. Variometer.

tuned, due to the changed inductances. This does not mean that the coils must be returned to their former close position, but rather that the signal should be tuned in again, with the coils somewhat separated, by means of the sliders or variable condensers. It will generally be found that the signals can be

made as loud with loose as with close coupling, and at the same time the possibility of interference is greatly reduced.

When condensers are connected in series as in Fig. 7, the total capacity is reduced. Thus the capacity between points A and C is less than that between either A and B, or B and C. Fig. 7 also shows a variable condenser connected in series in the antenna circuit, thus cutting down the total capacity. This circuit will therefore tune to a shorter wave length than otherwise.

When capacities are connected in parallel as in Fig. 8, the total capacity is equal to their sum. Thus the wave length to which the antenna circuit in Fig. 8 will tune is increased because the capacity of the variable condenser is added to the capacity of the aerial.

Fig. 9 illustrates the principle of the variometer. A represents a coil with widely separated turns. B represents the same coil with the turns brought nearer to each other. In the case of B the magnetic action of the current in each turn has much more effect on the other turns than in case A, and the inductance of B is therefore greater than A. C represents two coils wound in the same direction. If they are brought nearer each other, the total inductance is increased. If one coil is turned completely around so that its magnetic field opposes the other, the total inductance will be decreased by bringing them close together. In the variometer shown in Fig. 10 one coil is mounted on a shaft and may be revolved. The inductance is greatest when the current goes through both coils in the same direction, and least when it goes around the two coils in opposite directions. By means of a variometer we can have any amount of inductance between these two values.

(To be continued in January RADIO.)

Promoting the Sale of Radio Equipment

By Ellery W. Stone.

In the early days of radio, the bulk of the so-called amateur radio business was handled by the mail order method. But as the volume of business increased and as new inventions and developments were made, the number of manufacturers increased steadily and the form of distribution naturally changed. Radio equipment is not a staple article, the purchaser wants to see and handle his prospective purchase rather than to buy them from printed descriptions in catalogs, so that the logical contact with the purchaser is through the retailer.

According to "Electrical Merchandising," the market in this country consists of some 700,000 boys, men, and some women, ranging in age from 16 to 60, the average age being 21. Until the last year or two, the radio market consisted largely of the boy who bought radio parts and in many cases, only raw materials, with which he built his own equipment. That was before the advent of the radio telephone, when to be able to transmit and receive radio messages, it was necessary to learn the telegraphic code. As a rule, it was only the boy who had the time, the ambition, and—I must admit—the ability to become proficient in the code. And because he was only a boy with a youngster's naturally limited purchasing power, although as I have intimated before, this was sometimes unnaturally augmented, he was restricted to the purchase of parts only and he was able to build a set which he could not afford to buy ready made because he had an abundance of time which cost him nothing. Besides, he was not limited to eight hours daily production.

But with the advent of the radio telephone, the adult has become interested in the radio art, because it is no longer necessary to learn the telegraph code in order to gain employment from this pastime. Anyone now can enjoy concerts by radio in his home, no government license is required for receiving sets, and so far as technical knowledge is concerned, it is no more difficult—and probably easier—to operate a radio telephone than to drive an automobile. The equipment necessary to receive music and news items by radio is neither cumbersome nor elaborate and the cost is no more than that of a phonograph. It may be installed anywhere in one's home and there is no unsightly mast to be erected, as in the old days. A single bare copper wire strung from the roof to a house, tree or other support, say two hundred feet away, is all that is required.

The electrical dealer gets so many

This is an article which every amateur can read with profit. It is taken from an address given before the San Francisco Electrical Development League, many of whose members are prospective radio dealers. It illustrates the work that is being done to make it possible for every amateur to examine his equipment before purchase in his own home town. It also opens up the way for commercial advancement in the radio field on the part of ambitious young men.—The Editor.



Motor Boat Cruiser "Blanche S" equipped with Radio Receiving Set. Dr. Martin E. Simon, Flood Building, San Francisco, is the Owner.

calls for radio equipment that he has to put in a radio department. He hires a bright radio amateur for work after three p. m. and all day on Saturdays. Such an amateur knows what you need to carry in stock, he belongs to one or more radio clubs, his friends will buy from your store, and you will learn the radio business from him. But don't think you will be able to supplant him. Because when the time comes when you know as much about the radio business as he does, your radio department will

have developed to the stage when you will need all of your radio salesman's time and you will be looking for additional help from him.

What is the cost of the apparatus purchased by the amateur? The average boy starts off with a supply of parts and small equipment which will total from \$5 to \$15, and as his interest and his requirements increase, he buys more and better apparatus to add to or replace what he started with. The older amateur or the adult prefers to buy a set complete and his initial outlay will average at least \$50. By the time both types of amateurs get through with this thing, only fortunately for us they never do get through with it, they will have stations worth hundreds and even thousands of dollars.

"Electrical Merchandising" very conservatively estimates the purchasing power of the radio amateurs who "tinkers" and experiments at about \$25 per year. The radio customer who has the means and inclination to purchase complete sets ready made of course does not buy new apparatus often. But he does buy supplies for renewal, and as he increases the range of his set, and this invariably happens, he spends more for new equipment than the "tinkering" amateur spends in a number of years.

There are some 6,500,000 farms in the United States with at least one boy per farm who can learn to operate a radio receiving set. The Department of Agriculture has commenced the erection of eight radio telephone stations at the various agricultural centers of the country to broadcast by telephone crop reports, crop and produce prices, weather and stock reports. There are several receiving sets on the market designed especially for farm installation. The radio manufacturers are advertising in the farm journals and these journals are running editorials and articles on the subject. You jobbers have your salesmen out in farming territory. A radio line will be a profitable one for them to handle.

In addition to the boy amateur, the power company and industrial concern, and the farmer, there is the man who installs a radio receiver in his home for the reception of concerts, stock reports, baseball scores and other news items. I know of a man of means across the bay who has a radio receiver in his living room and his daughter, who doesn't know an ampere from a volt, operates the set and receives radio music in their home every evening. There are many such installations in private homes locally, pur-

(Continued on Page 246)

The Armstrong Super-Heterodyne

By A. K. Aster.

The rapidly increasing number of amateur stations makes it necessary to have an extremely selective receiving set in order to do any long distance work or to listen to any radio-phone undisturbed. To meet this demand the Armstrong super-heterodyne is the only system which permits almost unlimited radio-frequency amplification and allows you to get that faint fellow several districts away. Remember, that two or three steps audio-frequency amplification is about the limit, that a detector works much better on strong signals than on weak ones, and that the way to get strong signals into the detector is to use radio-frequency amplification.

Fig. 1 shows the wiring diagram of such a system adapted for use on short-wave-lengths. Its operation consists in heterodyning the 200 meter incoming sig-

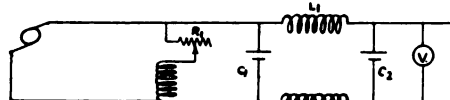


Fig. 1. Wiring Diagram for Radio Frequency Amplifier.

nals to some long wave-length, say 3500 meters, then amplifying them at radio-frequency, then detecting them, and finally amplifying them at audio-frequency to any desired audibility. The reason for heterodyning the incoming signals to some long wave-length is because this gives added strength and because radio-frequency amplifiers work better at long wave-lengths than at short ones. All this sounds far worse than it really is.

At this point let me dispel any fear which may lurk in the mind of the reader regarding the difficulty of handling this system. It is very easy to adjust, having no more settings than the ordinary feedback receiving set. In place of having to set the size and coupling of the tickler coil you have the coil and condenser of the local oscillator to set.

First tune the primary and secondary to the wave-length of the sending station and then adjust the local oscillator till the signals come in loud and clear. It will be noted that only the first step of the radio frequency amplifier is tuned, the other steps being resistance coupled. This is far simpler than the ordinary radio frequency amplifier because, once set, it does not need any further adjusting. It may be found necessary to keep the first step slightly detuned to prevent howling, otherwise this system is absolutely howlproof, a decided advantage over the feedback system. Those who have never used a properly designed set of this kind have no idea of its possibili-

ties. It is the only system for real relay and loop work. Contrary to current opinion this entire system can be successfully operated from a single "B" battery without difficulty.

The oscillator, tuner, radio-frequency amplifier and detector, and audio-frequency amplifier must be mounted in separately shielded boxes or in separately shielded compartments of a single box. I cannot overemphasize the fact that the system must be properly shielded to get satisfactory results.

If separate boxes are used, they may be lined with tin foil, including the inside of the front. Such boxes should be pro-

mounted inside of the boxes and shielded by mounting copper tubes around them. These copper tubes should continue through to the front of the box and there be capped by screening so as to permit ventilation and observation of the filament color.

The "B" battery for a system like this should be at least 100 volts and since at least four or six tubes would be used the upkeep cost, if flashlight cells were used, would be high. The solution is either a set of small storage batteries or a motor-generator set. A set of small glass jar storage batteries can be purchased for about the cost of three sets of

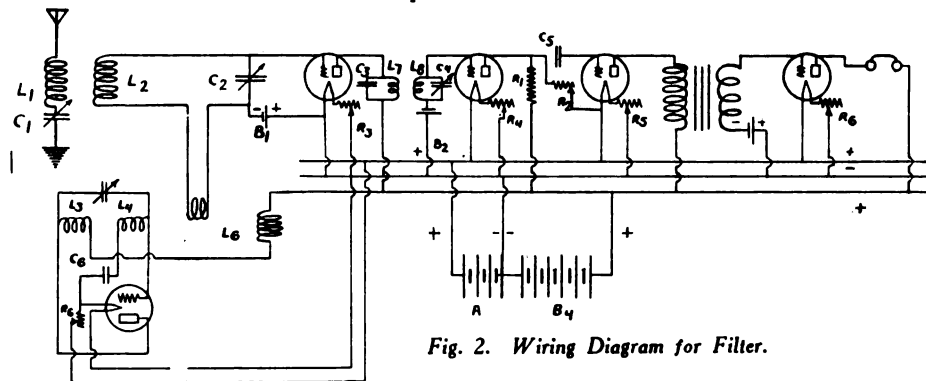


Fig. 2. Wiring Diagram for Filter.

- L₁ 25 or 30 turn HCC.
- L₂ 35 or 50 turn HCC.
- L₃ 30 turns No. 24 DCCC on 3-inch tube, tap at 8, 12, 16, 24 and 30th turn.
- L₄ Same as L₃.
- L₅ 10 turns No. 24 DDC on 3-inch tube.
- L₆ 200 turns No. 24 DCCC on 3-inch tube, winding space 1 1/2 in.
- L₇ 150 turns No. 34 DSCC-pancake I. D. 2 1/2 in. - 1/8 in. thick.
- L₈ Same as L₇ Coupling between L₇ and L₈ 1/4 in.
- C₁ 0.0015 variable (See Note 1).
- C₂ 0.001 mfd. variable.
- C₃ 0.00025 mfd. mica condenser.
- C₄ 0.0003 mfd. variable.
- C₅ 0.00025 mfd. mica condenser.
- C₆ 1 mfd. paper condenser.
- C₇ 0.0005 mfd. variable.
- R₁ 1/2 megohm.
- R₂ 2 megohm.
- R₃ Standard filament rheostat.
- R₄ Ditto.
- R₅ Ditto.
- R₆ Ditto.
- B₁ 1 to 6 cells flashlight battery.
- B₂ Same as B₁.
- B₃ Same as B₁.
- B₄ 110-volt battery or motor-generator set.
- A 6-volt storage battery.
- T Audio-frequency amplifying transformer.

Note 1 Condenser C₁ should be provided with a switch so that it may be put either in series or in parallel with L₁.

Note 2 The circuits C₃L₇ and C₄L₈ at M must be adjusted for resonance.

vided with a false front three or four inches back of the actual front. All tap-switches, etc., should be mounted on this panel and all controls, including condensers and rheostats, must be connected to the actual front by means of rubber or bakelite rods.

If a single box is used it likewise should be provided with a false front for controls, but it should be lined with thin sheet copper as, due to the proximity of the various parts, the resistance of the tinfoil would be too high for sufficient shielding. All joints of the box, except the top, should be soldered and the connecting wires from one compartment to another should be led through as small a hole as practical. No matter what sort of boxes are used, the tubes must be

standard 108 volt "B" batteries. Probably the most economical scheme in the long run is a motor-generator set. The writer built such a set from good second-hand machines for about the cost of a standard 108 volt "B" battery. The generator can be made of any good 110 volt d. c. shunt wound motor having at least 36 bars on the commutator and having a well, electrically balanced armature. All armature coils must have the same number of turns, otherwise it is practically impossible to smooth out the commutator ripples. The motor to be used as a generator should be rated at 1100 r. p. m. because such a motor when driven at 1750 r. p. m. will develop about 110 volts, which makes it possible to directly connect it to a standard 1750 r. p. m.

motor. The driving motor, if a. c., should be of the enclosed type so as to have as little external field as possible in order to keep the a. c. hum out of the plate circuit of the tubes. Mounting the motor-generator set on a non-magnetic base will also help matters. If the plate voltage generator is some distance from the set the leads should be made of lead covered wire or run in conduit. The sheathing should be well grounded in either case in order to cut out power line induction.

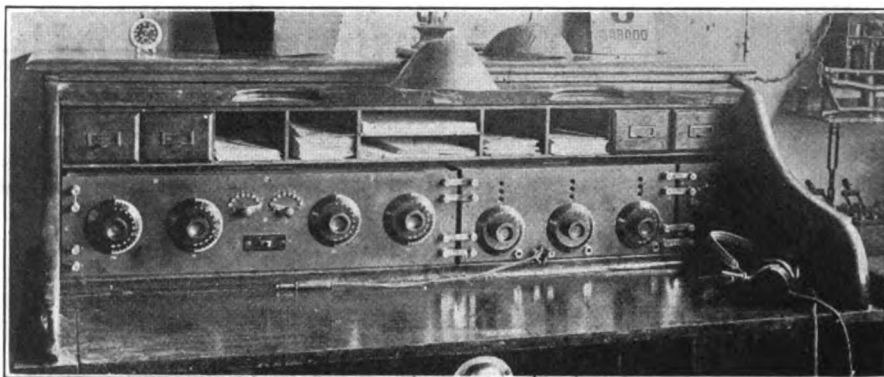
The design of a filter is a case of cut and try for each individual generator. (See Fig. 2 for approximate dimensions and wiring diagram.) The motor-generator set has the advantage over the storage batteries because it needs little attention other than an occasional cleaning and oiling. The commutator of the generator must always be kept thoroughly clean so as to insure sparkless commutation, which is absolutely necessary. The brushes should be of hard carbon and properly fitted.

Another point which must not be lost sight of is that operating five or six tubes puts a heavy drain on the "A" battery and if this is not large enough it will not hold its voltage steady for any length of time, which means continual adjustment of the filament rheostat and unsatisfactory operation. The battery should be large enough to deliver at least six amps. for 10 or 12 hours.

To those who are not accustomed to operating a number of tubes in parallel let me give a word of caution which may save the filaments of a few tubes. When shutting off one or more tubes of a bank of tubes operating in parallel always shut off the entire bank first, then cut out the desired tubes, set all filament rheostats for minimum current and you are ready to turn on your tubes again. If you cut out a tube while the others are burning the rise in current is liable to burn out the entire remaining bank of tubes. Another thing to remember is that the filament circuit must be connected up with heavy wire, as a very small resistance produces a very large voltage drop on low voltage circuits. This is especially important if the batteries are some distance from the set.

For those who are interested in loop work this is the ideal system, for thereby radio-frequency amplification can be used under advantageous circumstances, that is, at long wave-lengths. With a fair sized loop and five or six stages of radio-frequency amplification one should be able to pick up amateur stations at surprising distances. It should be remembered that a loop is very free from static and interference can be eliminated by adjusting for direction as well as for wave-length.

To doubters all I can say is "the proof of the pudding is in the eating."



New Radio Shop Receiving Set in Use.

THE SOUTHERN CALIFORNIA RADIO ASSOCIATION DINNER-DANCE BY "6XAD"

Decidedly it was a success! Thanks to the "wim and vigor" of President Lex Benjamin (6MK) the "party" given at Panlais' in Los Angeles, on the evening of November 7, was very much in the nature of a thumping—success!

Broadcasted daily by the Western Radio Electric Co., and the southern branch of the Leo J. Myberg Co., so well heralded had the affair been that at the mustering for food there were more than 80 members present, with a modicum—too much of a modicum!—of the more Deadly Species of the Race! Radio 6XAK had intimated that all the ladies possible were to be brought, and that if one had not a wife—or a sweetheart—to bring some one else! Thus conforming precisely with the spirit of the modern day—C.W., 'neverthing! The tables were charmingly decorated with flowers, and favors of various and amusing kinds were en masse.

Interspersed with sallies from Ye Hon. President—and general gayety—the dinner progressed to a satisfying (!) end, and President Benjamin introduced a new member—U. S. Deputy Game Warden Lawrence Mott—associate editor, sometimes known by his alias of "6XAD"! Mr. Mott bored the spark men intensely—and cheered the C.W. men correspondingly—with some pertinent remarks on the reckless disregard of the radio laws by certain spark operators in the Southland, and ventured the prophecy that unless amateur operators, the nation over, behooved themselves and walked with a good deal more circumspection, the amateur fraternity stood to lose the government's interest, and the plainly-evidenced friendship of the present administration.

Mr. Mott then explained, cursorily, the new plan of the Organized Reserves, Signal Corps division, and a great deal of interest was manifested.

Some interesting words were pronounced by a member of the Naval Radio Service, in which he, too, plainly stated that spark men were getting themselves strenuously disliked along the coast by

A NEAT RECEIVING SET

The illustration shows a business-like arrangement for a radio receiving station, belonging to Rev. Clarence E. Woodman of Newman Hall, Berkeley, Calif. The desk part of it, while presenting a somewhat opulent appearance, is really constructed from an ordinary kitchen table, with under-panelling made from some matched floor boards found in the cellar. The roll-top part was bought second hand. After removing the lower row of pigeon holes, the space was just right for the "Radio Shop" set shown in the cut. The small panel, at the extreme right of the set, contains the B battery. In front, under the drawer, are six binding posts for three telephone receivers: A "Murdock," a "Liberty" and a "Baldwin." At the right of the desk are seen three throw-switches: That at the right is a 3-pole single-throw switch, to cut in any one of three aerials. The middle is a D.P.D.T. switch to connect the aerial and ground either with the desk set or with any experimental one; (the latter hooked up to a pair of binding posts shown at the front edge of the table.) The left-hand switch is for the A battery—connected either with the desk set; or with any other, by means of the pair of binding posts corresponding. The "Radio Shop" set has been found highly efficient, and gives thorough satisfaction.

the fleet's officers for causing QRM FAR above 200 meters! Not many amateurs, to be sure, but enough to create ill feeling!

I asked him point blank whether the fleet ever suffered QRM from C.W. operators, and the answer was both a prompt and a satisfying one: "Never, sir!" 'Nuff sed!

Yes, it was a jolly party, and it is hoped that one such can be arranged for each month. Personally, I hope so, as there is seriously lacking in the Southland a cohesive spirit!

GET TOGETHER, SOUTHERN DIT-DAHS!



9BD (Canadian) at Vancouver, B. C.

A Northwest Mystery Explained

Due to a change of call number from 5BR to 9BD the experimental radio station of Wm. D. Wood Jr., at the Barron Hotel, Vancouver, B. C., has created much curiosity among Northwestern operators. Mr. Wood has an experimental license from the Canadian government allowing 200 meters for spark and valve set. All owners of Canadian experimental licenses must be holders of first class commercial certificates of proficiency in radio-telegraphy, Canada.

His antenna is a 7-wire "L" on the hotel roof, with cage lead-in from the south end. The aerial points due south. It is supported by two 40-foot poles with 16-foot spreaders in flat top. The total length of wires is about 100 feet and natural, period of aerial about 180 meters. An insulated counterpoise of the same dimensions is exactly under the aerial, and 5 feet above the tin roof of the building. This is used for the phone and C.W. set.

One K.W. type "T" spark transmitter with 20,000-volt secondary at all powers has been used up to the present time, but Mr. Wood has just secured a United Wireless "Coffin" type transformer with a 30,000-volt secondary, which will be used for extreme "DX" at a later date.

The gap is a Benwood super-synchronous, bakelite case. Various numbers of electrodes have been tried on the removable disc with final decision to use eight electrodes, as when the gap has but four electrodes the strain on the condenser is so great that it is likely to puncture if the "Coffin" were used. The only thing that might be improved upon the Benwood "sink" gap is the method of adjusting it to synchronism. If a device for making this adjustment easier and more accurate could be attached, it would be quite an improvement, in Mr. Wood's opinion.

Four Marconi Leyden jars of .003 mf. each are connected in parallel for a con-

denser, and give a total capacity of .012 mf, which is considerably more than most amateurs are able to get away with and still keep below 200 meters. These jars are only supposed to withstand 15,000 volts, but the fact that they stand up under twice that voltage speaks pretty well for them.

The primary inductance is one and a half turns of 1½ inch brass ribbon mounted in such a manner as to be all useful inductance and not leads. The secondary of the O.T. is 8 turns of 1-inch brass ribbon, but only 5 turns are in use at present.

Six-inch coupling has been the adjustment for the past month or so, and with adjustment 4.2 H.W. amps are going into the aerial, but to prove that amps. don't mean much in some cases Mr. Wood was reported just as QSA by a "seven" station when he had reduced power and was only putting out 1.3 amps. On the night of Oct. 24, 6KA in Los Angeles said he was QSA and on this occasion the amps going into the aerial was about three and no more, and the coupling at about eight inches separation.

9BD has been in operation for a very short time and therefore has not done much "DX" to speak of, but wherever reported the sigs are usually "QSA OM" whether true or not.

The phone and C.W. transmitter is a 20-watt output set, using four 5-watt tubes and the Heising circuit. At a later date concerts will be sent out for the benefit of local amateurs. There is no other amateur phone station in British Columbia to date, so it will be new to the majority of amateurs to get the music in Vancouver via radio. Data regarding the phone set will be given in detail at a later date as no work of importance has been accomplished with it so far.

The receiver is a Radio Shop regenerative with a home-made detector and two-stage amplifier.

9BD VERSUS 5BR

Time: Oct. 15, 12 to 1 a. m.

Place: The air.

(fade in) 6QR working 9BD (they finish), 9BD coming in very QSA (then finish).

9BD 9BD 9BD 9BD.....

.....9BD 9BD de 6CP 6CP 6CP

6CP (long call dx stuff).

9BD 9BD 9BD 9BD.....

.....9BD 9BD de 7YJ 7YJ 7YJ

7YJ (also slow dx stuff).

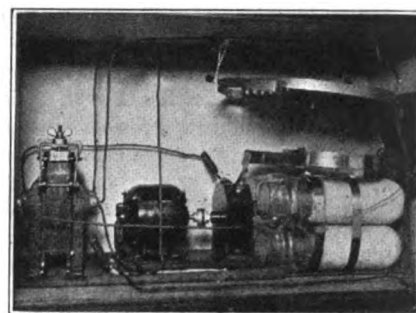
9BD 9BD 9BD 9BD.....

.....9BD 9BD de 7BH 7BH 7BH

7BH (7BH puts extra dashes in his nines to make the impression of distance more emphatic). hi. Silence, still no answer from 9BD. 6QR de 6CP sa om who is 9BD anyway. 6CP de 6QR 9BD qra Canadian special station, old 5BR, Vancouver, B. C. (All fade out.)

Moral: If you don't think anyone hears you, just sign off a 9— call.

We'll bet 9BD in Chicago gets a couple of dozen "heard you" cards out of the deal anyway.



9BD Benwood Cap and Condensers.

LETTERS TO THE EDITOR

Sir—We have read Mr. Carl Soderstorm's letter in the September issue of your publication, and, while we agree to a great many of his statements, there are some things which we would like to discuss in all fairness to the modern radio operator. With regard to the use of audions and other modern apparatus for reception, there are, of course, many advantages and disadvantages.

It is true that the service companies are paid to furnish apparatus, and the operator is perfectly within his rights to rely on this apparatus solely for communication. However, when everyone else is covering all kinds of distances and working circles around the users of crystal detectors, it is only natural to expect the commercial operator to try and improve his range. The navy has used audions and other modern reception apparatus for a number of years and has found it not only as good as the crystal, but far better. All important stations on land have used audions even to the extent of paying royalties for the privilege of so doing.

Can Mr. Soderstorm support his claim that radio communication was conducted

(Continued on Page 248)

Christmas Off the Florida Coast

By "Sparks."

"Wishing you a Merry Christmas and a Happy New Year" was the way the cards read—the cards that our relatives, friends and sweethearts sent us. We received them as we cast off the lines that held our tiny tow boat and her tow, a long, unwieldy, sinister-looking concrete car float—to the dock at the Army Base, Norfolk, Va. As the "let go" whistle, one long and two short, sounded, the clang of the engine room bell floated harshly up to us of the decks and we were off! Out through the narrow Army Base channel we threaded our way, turning into the main ship channel at the black bell buoy and leisurely made our way to sea, out past the capes of "Ole Virginny."

The glass being low, we hugged the beach so that the west wind did not have so much effect on us, the car float sheering from side to side and almost overtaking us at times.

Coastwise men have a habit of running fairly close to each other in order to save as much time as possible but you can bet they gave us a wide berth that night—that sheering contrary mass of steel and rock caused many an old time skipper to don trousers over his pajamas, slip his deck-flattened feet into a pair of "mules" and "hit the deck" on the "cat-hop" at the urgent request of an alarmed second or third officer.

Leeway! Sink my side! We set the usual course down the beach to Cape Hatteras. At 8:10 A. M. the following day this perverse piece of war-amateur built junk that constituted our tow actually parted a $\frac{1}{8}$ steel chain and one $\frac{3}{8}$ steel chain. We stopped, brought her alongside, and repaired them.

Upon arriving off Cape Hatteras we found our sister ship, S. S. Tacony, also with a concrete carfloat in tow. By the time we rounded "Diamond Shoal" light ship the wind was howling out of the nor'nor'west. A great piling sea was breaking over us. The carfloat was pulling us back and jerking like some living thing that did not want to lead. We were in a tight place there for a while. The seas were breaking under us as they raced over those deadly shoals, the graveyard for many a good ship and gallant crew. The captain stepped down into the engine room and, calling the chief engineer to one side, said quietly, lest the men hear: "Give her all she's got until I give the word, Chief; we're on Diamond Shoals." Well, the Chief certainly shook her up and we pulled slowly into deep water and a loon laughed hysterically out there in the darkness. We pulled, strained and battled all that night—fought the seas, defied the wind and lived.

At 8:30 next morning a second bridle carried away, but the waters were too rough to go alongside so we plugged on and on praying for the one side to hold her. At Cape Lookout light ship we turned for Cape Lookout light where Cape Lookout bends a protecting arm southward.

At the entrance to this partly artificial partly natural harbor, the last link carried away and here she went hell bent for election for the beach. We caught her, brought her alongside, and made her fast for the night.

The following morning we repaired our bridles and proceeded on our way, not knowing whether the Tacony had lived or not. Finally we saw her—she sent us a radio, saying she was going into Charleston for supplies. We did not think it necessary and told her so in our reply.

We went on and on—washed and rolled, rolled and washed, until Hillsboro lighthouse, way down there on the coast of Florida was passed and then—both bridles carried away at 4:10 a. m., darker than the pits of hell, a gale blowing from the north, the Gulf Stream running north at a rate better than three knots per hour—you can imagine the seas.

We pulled in what was left of our hawser and went back over our trail to look for our lost protegee. We found her at 5:40 a. m. When dawn came we went alongside. She sprung our starboard rail, but a line was made fast to one of her bits and we put a strain on it so as to pull her up under the beach to smooth water—the line parted. Another one was made fast, it parted. In order to get away before she would ram us the captain gave the engine room a full speed astern bell. We got away all right, but when we started to come forward the engines would not move—a line was fouled in our propeller!

There we lay absolutely helpless, rolling in the trough of the sea. We sent out a radio call for help, which failed, but, thank God, we were drifting towards land. A seaman was on the carfloat and when we had drifted to ten fathoms of water we let go the anchor, put a lifeboat over the side with the second officer in charge to get the man off the carfloat and return to the ship. As they left, the wind shifted to the east, making the carfloat dead to the windward, and for every stroke of the oars the lifeboat would go back three feet. The second officer, realizing that to make the carfloat and return to the ship was impossible, gave all his attention to landing on the beach. They landed safe and sound,—the last we saw of them until we arrived at Key West.

What was that? A vibration? Are we aground? I ran to the engine room and put my head inside. The engines were turning over. We promptly heaved in the anchor and made for the carfloat before she would go aground. We made her and got the towing cable on her this time, but were aground three times in the effort.

We proceeded on our way, dead tired, dirty, hungry and with the pleasant knowledge that it was watch for watch (four hours on, four hours off) until we reached our destination. This all happened on Christmas day, December 25, 1920.

"Wishing you a Merry Christmas and a Happy New Year" was the way the cards read,—the cards that our relatives, friends and sweethearts sent us. And a loon laughed hysterically cut there in the darkness.

HAM CRUDITIES AND ODDITIES

(Or: Why the Ether Is Jammed!)
Over-Hears by "6XAD"

(N. B.: When a chap is trying to do serious work—gets msgs through—or listen for l-d calls—it is ALWAYS so pleasant to hear—hour after hour—such as these):

"A cat has nine lives but a frog croaks every night." ($\frac{1}{2}$ hour's work to get an "r" on that, from San Francisco.)

"Saw Maggie with Fred tonite wheres Bill?" (Ha! SCANDAL!)

"Do u hear me any better now?" (Asked for 'steen-millionth time!)

"Pse listen while I do sum tuning." (Followed by 11 mins of "V's.")

"Harrys got a new Chandler eight." (12 mins of accurate description—paint, body, etc. Radio 6—ought to be an Agent for the Chandler!)

"Saw Jones abt moving chicken hse and he sed—" (14 mins vastly interesting info. I know all about moving chicken houses—now!)

"Am thnking buying motorbyke what u advise?" (16 mins' advice given. What I know not of motor bykes is not worth knowing!)

"Went to B—'s new soda ftn today his nut sundy fine." (How eeenormously interesting!)

"Awful grouch on father tonite cant wk long." (Hurrah!)

"Mother sez dont hav tooth pulld ul need it when you are old." (Mother is wise!)

"Going be sick tomorrow wont hav go school." (The OLD stuff!)

"Wich Dillonld come down and listen 2 all these brd spks." (Cheer the wish to the echo.)

And so on—AND so forth, dit-tah without end. AMEN!



A Distress Call at Triangle

(Triangle Island, a mountain peak protruding from the Pacific off the northwest end of Vancouver Island, rises abruptly to a height of 680 feet. The Canadian Government radio station which crowned its summit was closed down in June, 1921, a transfer being made to a less isolated location.)

Triangle Island trembled and the wireless office shook;
The radiotelegraphist glanced up with puzzled look.
The wind came from Queen Charlotte Sound, below there
in the gloom.



Beating on the windows with a fearful note of doom;
It blew with sudden fierceness, as only east winds blow,
And lashed the sea to fury six hundred feet below;
The spray dashed up the cliff-sides, and it made a salty rain
That drenched the rock's high plateau and flew to sea again.
This was the most tempestuous night that he had seen or heard;
He thought the island trembled (but that was quite absurd)
The wireless house might shiver, and the shock might be
profound.

But the building, like its engines, was bolted to the ground;
The roof might shed its shingles, and the windows make a din,
The ice-edged wind was all outside and comfort was within.

Signals from the stations all up and down the coast,
Varying from a drum-beat to the whisper of a ghost—
Some high-pitched and strident, and others merely drones—
Superposed and intertwined, they sounded in his 'phones.
Seattle and Victoria, Prince Rupert, Estevan,
North they came from 'Frisco and south from Ketchikan;
Shrill note from a "K"-boat, slobber from chopped arc;
Many kinds of music from as many kinds of spark.
The "Emperor of Africa" was seven days from land,
And working now with Estevan she sounded close at hand;
The Honolulu station was very faint and thin
(Outside the gale was raging but the fire burned bright within).

A lonely life is radio, if lonely one can be
With all the north Pacific to bear one company,
With ready means of flashing thought with all the speed
of light;

For ever and where'er they be,
Ploughing each her furrow free
Ships upon the sombre sea
Are speaking through the night.



Unfaltering the signals came, and out of all he heard
The storm they had to penetrate affected not a word,
For naught can stop electric waves, divert them or delay;
The radiated impulses go heedless on their way.
But no ship called his station (and this he did not mind,
For starting up an engine is labor of a kind);
He merely sat and listened to the voices in the air,
His feet upon the table and reclining in his chair
In indolent position—one might have thought he slept,
But the vigil never ceases where a wireless watch is kept.
For ever-present service, unseen by those they serve,
Wireless men upon the coast,
At their isolated post,
Are least considered of the host
Who work with brain and nerve.

The boisterous night was passing and at last a glimpse of day
Came creeping over Triangle and drove the wind away.
The operator left his 'phones to stretch and breathe a spell,
For with the night the signals were fading out as well;
He took a turn around the room, and then a step outside,
Drinking in the freshest air that sea-girt hills provide.
The sun that pierced a filmy mist persuaded him to stroll;
He walked a dozen yards or so and climbed a little knoll.
Before him stretched a corner of the greatest sea of all;
It boiled and wrought its violence below the rocky wall.
He went a little further and he halted with a start,
He halted with a shudder and a leaping of the heart,
For he stood in a position where he knew the eye could reach
The churning of the breakers on the boulder-studded beach,
And now the beach was buried full twenty fathoms deep.



Straight from the water's level the cliffs rose clear and steep;
The island's base was hidden and the ocean had encroached
On all the hollow places where the height could be approached.
This was no time for standing there, this was no time to think
What seismic disturbance might have caused the isle to sink.
For Lanz Isle and the Haycocks were nowhere to be seen,
The sun had shifted northward from the point where dawn
had been—

And then a slight vibration, like the rocking of a boat—
He knew at once these signs must mean: Triangle was afloat!
Its narrow point to windward and its broadest end to lee,
It had slid away before the gale and drifted out to sea.
With sailless masts and rudderless, it wandered where it would;
A grotesque ungainly barge,
Roaming on the sea at large,
With a wireless man in charge
Who was spellbound where he stood.

Blunderingly he hastened back, deciding as he went
Not to wake the other fellows till the call for help was sent;
He set the flywheel spinning, and the engine gathered speed,
Then sat to send a message that all the world should heed.
He sent a call out broadcast, and an answer came at length
From Estevan, with signals of but half the normal strength;
He told in hurried phrases of Triangle Island's lapse
From insular solidity to a nautical "perhaps."
Letter followed letter as he jerked the signals free,
Letter followed letter as he pounded on his key,
Sending out to everyone the message of distress:
With a roar and with a crash,
As the disc smoothed out the flash,
By the magic dot and dash
Went forth the S. O. S.



The echo of the final flash had scarcely died away
When the chair slid from the table and the place began to sway
The tuner toppled over and hit the rising floor,
As the operator dodged the stove and scrambled through the
door;

Stumbled on the moving steps and struck the tilting ground,
Seeing in that instant that the waves were close around.
The island was submerging, for ended was its sail
(For gone was all the impetus imparted by the gale);
Higher rose the water till it touched his feet at last,
Higher yet and higher as he grasped the central mast;
Unscalable when vertical, he climbed it now with ease—
A yard or two each time it swung to forty-five degrees.
Impressions were chaotic now—he had not far to go—
The chimney lashing through the waves was all that showed
below.

Then downward plunged the wireless mast, and downward
too, went he,
Down into the clutches of the icy, stifling sea.
The frenzy of complete despair demanded effort yet;
And he fought back with all his might
Till he rose back to the light,
Where all that was in sight
Was cold and very wet.

All nature mocked the human speck that struggled there in vain,
The wave-troughs pulled him down with them, but still he
rose again,
The sun beamed bright to ridicule all lingering trace of hope;
But the "Emperor of Africa" was throwing him a rope.

The island seemed to tremble, and the windows made a din;
Outside the gale was raging, but the fire burned within.
The radiotelegraphist, reclining in his chair,
Was languidly attentive to the signals from the air;
The warmth had made him drowsy, and he noted with surprise
The clock had stolen half an hour before his very eyes!
His log required an entry, and here it seemed to be—
For the "Emperor of Africa" was calling V-A-G.

—Will Burford.



Radio Verse and Reverse

PEACE AND GOOD WILL

By J. F. DILLON

*Like the fog that drifts in from the ocean,
An impenetrable curtain of gray,
So the angry passions encompass the mind,
Obscuring the clear light of day.*

*Gone then is the poise which we boasted,
And all true sense of justice and right,
The abysmal instinct of ages long past,
Has returned like a thief in the night.*

*Shall this demon of malice and hatred have reign
In a soul consecrated to love,
When charity and tolerance of thought and of deed,
Would dispel all the darkness above?*

*If the mind close the bars of its portal to hate,
And conjure thoughts of love and of right,
In His infinite wisdom the Master of all,
Will sanction and aid in the fight.*

*The dear friends we love are precious jewels
most rare,
So let us prove to them worthy each day;
How vacant and dreary our lives here would be
Without them to brighten the way.*

INDEED IT IS!

By "6XAD"

*When at night you're DX sending,
Rhythmic dots and dashes blending—
And some spark breaks in—unending—
Ain't it . . . grand?*

*When you hear that far "2" Station
With such feelings of elation . . .
And a spark roars in . . . damnation!
Ain't it . . . grand?*

*As he opens up—full power—
Keeps on going—hour by hour—
Just discussing some girl's flower—
Ain't it . . . grand?*

*When you hear his squawk go flooey—
"Blow his works, migosh! Oh blooey!"
Doesn't that your life re-new-y—
And: AIN'T IT GRAND?*

MUSIC IN THE AIR

By P. FENNELL

*Are you very fond of music as it's sung—
Do you revel in the touching tenor tongue,
Would your inner soul delight
In a Bach or Wagner night
If you didn't tuck your torso in a suit that's far
too tight?
Maybe you profanely holler
When you don your evening collar
That the bore of formal clothing sends your
pleasure out of sight.
And perhaps you tell your consort
When the taxi driver calls
That you'd fain attend the concert
In your khaki overalls.*

*If you're really strong for comfort and for ease
You'll enjoy the lines that follow after these,
For they'll tell you—and it's true—
What your radio will do*

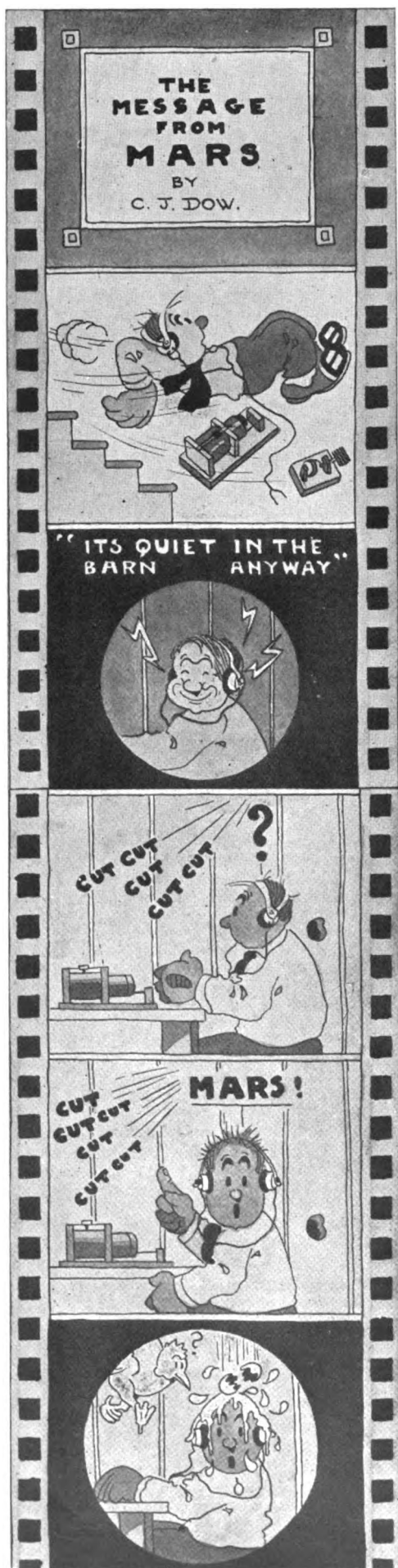
*When you want to hear some music without
getting black and blue
From a fight with starched linen,
Causing cussing, which is sinnin'
Well, the trick is very easy. It's available to
you.*

*Simply string denuded copper
From your chimney to a tree
And your wireless is ready,
Music, absolutely free.*

*If for Sunday church you find you're rather late,
Tune your wireless up for services and wait.
You will hear the hymn and prayer
And the choir on the stair;
And in time the morning sermon will inspire
via air.*

*Then you'll hear metallic trickles
As the deacons gather nickels,
But you really can't contribute if you really
are not there.*

*You can share a thousand wonders
Or enjoy these all alone
When your house includes the presence
Of a wireless telephone.*



Things That Never Happened!

Codfish for Christmas

By Volney G. Mathison.

OLD JUDGE DRIFFIN, sometimes disrespectfully referred to by Samuel Jones as Dopey, was badly rattled. Beads of sweat were springing out on his face and his hand shook nervously on the key as he asked N-P-R for a third repetition of a message he had been vainly trying to copy for the past half-hour.

Biting his signals off angrily, the gob at N-P-R bounced through the telegram again. The navy man's snappy sending flustered Old Judge more than ever. His fourth copy of the message looked about like this:

"Nr1 ck—n—SagFranc—Nog—Jotees Cal Alaskp Codfish Cogtany, Unga, Alaska: Driffin has asked for posuion as radio oanerator w K-V-I whr you legee gxt gmlthfsm yough judqent he is atsls opelate qke aflavit tothw effertit and radio fspetrtor pill mrpt him a anroviuslaanerzt if hrot ascanble hold job immfiteainy adtsseand we will send twou a relig on scssoneae ppgasseak sliling in thri days. Anspr. A. C. Co."

With a short, terrified gasp, Old Judge clutched at the key and stuttered out still another woeful Q-T-A.

"Hey, holy criminy, whassamatter!" howled the enraged gob at N-P-R. "Who in h—I ever told you you could operate, anyway! You ought'a be in a wireless kindergarten copyin' rat-cat-dog four words an hour off'n a omnigraph! For th' love of mud, get that operator an' lemme get clear before I go bugs an' jump off'n th' bluff into th' Bering Sea!"

"Shucks, that won't do, Dopey," disgustedly declared Samuel Jones, who had been listening in all the time on an extra pair of phones cut into the circuit. "In about a week you'd have that poor gob goin' out an' hangin' hisself on his wireless pole—gimme th' key."

His face red with shame and mortification, Old Judge gave up his chair.

"Sorry, O-M," flashed the clear, smoothly-sent signals from the steady hand of the veteran brasspounder; "I'm pullin' out'a here next month, an' was tryin' Dopey out to see if he could hold down th' job—guess he won't pass muster, though. Slip me that blue."

The gob came back on the air, spluttering angrily.

"Well, all I gotta say is don't you ever spring him on me again if ya don't want me to send you a box of dynamite fer Christmas!" he barked. "Ain't it bad enough to be stuck out here in th' middle of th' ocean on a sliver 'a ice-covered rock along with a gang of home-brewin' lunatics, without sendin' all day to a confounded old codfish who couldn't read three words a week if ya sent him a copy of th' message by mail first! Here's that blue—copy:

Nr 1 ck 58 nl San Francisco, Nov. 15. Jones, care Alaskan Codfish Company, Unga, Alaska: Driffin has asked for position as radio operator at K-V-I when you leave. If in your judgment he is able operate, make affidavit to that effect and radio inspector will grant him a provisional permit. If he not capable hold job, immediately advise and we will send you a relief on schooner 'Anangashak' sailing three days. Answer. A. C. Co."

Samuel Jones gave the navy operator an O. K. and told him to stand by.

"I'm goin' to tell 'em to send up a man," he said bluntly, showing the message to Old Judge.

The look on Old Judge's face was tragic.

"I—I—couldn't I have another chance, Sam," he pleaded. "Knowin' it was a test made me rattled; an' seein' th' message was somethin' about my application for this job made me more flustered than ever—"

"No, you might as well forget about tryin' to run this station," sharply interrupted Samuel Jones. "You ought to've had enough, after th' mess you've made of the schedule this afternoon—I guess I was a fool ever to encourage you in thinkin' you could handle K-V-I. Go an' play with your ham set—you seem to do better with it than you do here."

Drawing a pad of sending-blanks toward him, Samuel Jones wrote out a message.

Old Judge made as if to speak again, but then the spark crashed out with its heavy roar and a telegram was started on its circuitous road to San Francisco. Old Judge easily read the younger man's strong, steady sending. The preamble went by unnoticed, but the concise text cut him to the heart:

Driffin incompetent send man on schooner.
As Samuel Jones sat waiting for an acknowledgement from N-P-R, Old Judge stepped softly to the door and stole out of the station.

Across the tops of the white-crested seas that were sweeping into the bay came a wily-wawing southeasterly squall, which swirled fiercely along the granite cliffs where the wireless shack snuggled, and pelted Old Judge with a blinding flurry of soggy, wet snow that made him sink his head still lower in his mackinaw as he stumbled disheartenedly along the narrow trail which led up through the village.

His failure to get that wireless job was a bitter disappointment to Old Judge. It left him completely in the lurch. As federal commissioner, Old Judge drew no salary. He received a meager fee of eight dollars each time he held court, which since the advent of prohibition and an extremely easy-going marshal, he

did not have occasion to do hardly oftener than once a month. He was also the village postmaster; and the revenue he derived from this, along with a few straggling dollars gleaned from performing sundry Siwash weddings and by acting as administrator when some fishermen's row ended with Colts and tombstones, served to keep the wolf from the old fellow's door—but only by a scant margin. Indeed, his mode of living was little better than hand to mouth.

In justice to Samuel Jones, it is necessary to state that he knew nothing whatever about Old Judge's financial affairs, and imagined him wanting to get K-V-I merely from a childish desire to have a larger wireless set with which to amuse himself.

Reaching his dwelling, which stands on a knoll in the middle of the village of Unga, hardly a thousand feet from the wireless station, Old Judge mechanically brushed the snow off his worn mackinaw and twice-half-soled shoes, and went slowly in.

Lying on his table, waiting to be opened were four big packages, all marked in flaming red letters: "Wireless apparatus—don't crush." They had arrived that very morning in a bunch of mail dropped by a passing steamer.

STANDING there disconsolately, contemplating the four packages, Old Judge's thoughts wandered back to the happy period not long past when he had first become a wireless amateur.

His amateur set, which had come to him through his friend Hell-fire, the builder of K-V-I, consisted of a two-inch spark-coil, a small loose-coupler, audion detector, and a few essential auxiliaries. The coil and the audion were operated on a storage battery, which was charged by means of a small power-line strung along the village housetops over to the codfish company's station. Outside his dwelling, two neatly-guyed eighty-foot poles supported his aerial, a good-looking antenna in every respect, though it paled into insignificance below the towering masts of K-V-I only a few hundred feet away.

For several months Old Judge had been supremely content with his little set. He established friendly relations with the operators of the Alaskan steamers that occasionally went by the isolated Shumagin Islands, and with the lapse of time every brasspounder on that run had come to know and look for the old fellow's fuzzy spark-coil note.

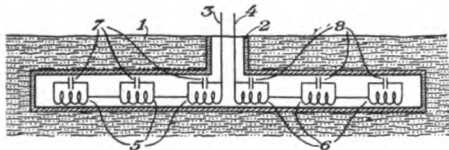
But eventually Old Judge became a
(Continued on Page 222)

Digest of Recent Radio Patents

Prepared by White, Prost & Evans, Patent Attorneys, San Francisco, who have been particularly active in the radio field for many years, and from whom may be obtained further information regarding any of the patents listed below.

Earl C. Hanson, No. 1,388,336—August 23, 1921.—Underground and Submarine Antenna.

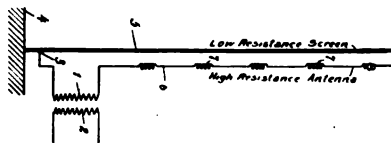
An antenna is described adapted to be placed underground, so arranged as not to be responsive to strays. This is effected by forming the antenna in spirals to



increase its self-induction. Thus strays, being highly damped, find difficulty in passing through, but sustained oscillations can get through. To enhance the effect, sections of the coils may be bridged by condensers which are properly tuned relatively to the shunted coils so as to produce the right effect.

Pupin & Armstrong, No. 1,388,441—August 23, 1921.—Multiple Antenna for Electrical Wave Transmission.

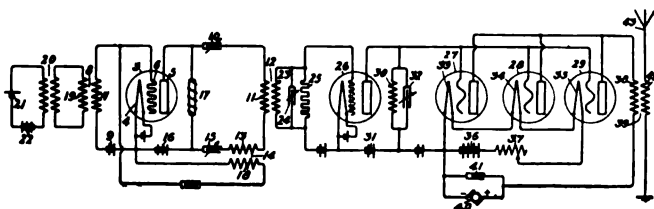
A low resistance, low inductance, antenna is inductively coupled loosely to a high resistance, high inductance antenna. The high resistance antenna is the



one actually used for receiving and is tuned to the oscillations to be received; the other being used merely to screen impulses of short duration. Such short impulses are dissipated in the low resistance antenna by oscillations which have a very high period, equal to that of the natural period of this antenna. Since the coupling is loose between the two antennas, these oscillations have little effect upon the high resistance antenna.

Colpitts & Arnold, No. 1,388,450—August 23, 1921.—Transmission of Intelligence.

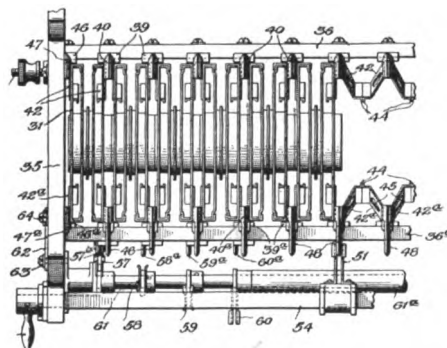
This patent described a scheme for sending high frequency modulated waves of high power. The modulations are produced by an ordinary telephone transmit-



ter 21 which modulates waves of radio frequency of amplitude comparable with that of the modulations. The modulated waves are then amplified and caused to radiate energy from the antenna 43. The low amplitude carrier waves are generated in an oscillating audion tube 3, the input circuit of which is coupled to the transmitter circuit. The output circuit of the oscillating tube is amplified by tube 26, and then by tubes 27, 28 and 29 in multiple. For powerful sending, hundreds of such tubes as 27, 28 and 29, are connected in multiple.

F. Lowenstein, No. 1,388,834—August 23, 1921.—Spark Gap Apparatus.

A quenched spark gap is described, so arranged that any number of individual spark gap units up to a limit may be independently inserted between spring contacts to form an apparatus of any

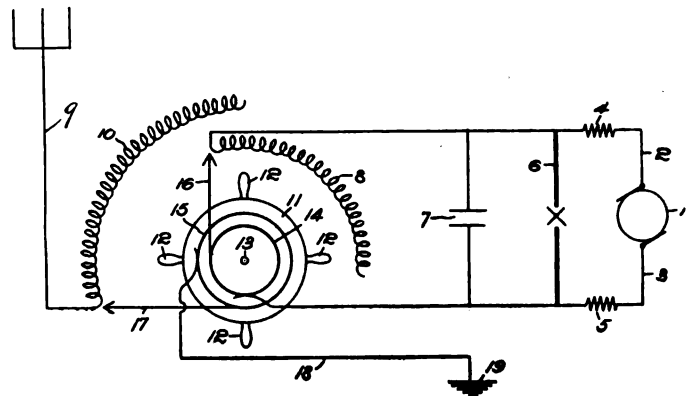


required number of gaps in series. The spring contacts 42 are so arranged that they automatically complete the circuit upon removal of any gap unit, as for repairs. The gap units have chimney-like flanges 31 of metal which serves the double purpose of providing a metallic contact to the springs 42 and of conducting the heat away from the spark gap. Switches are also provided for short circuiting any member of the gaps without necessitating their removal, and at least

one of these switches is so arranged that the number of gaps may be varied in steps of one so that accurate adjustment may be obtained.

J. H. Hammond Jr., No. 1,390,288—September 13, 1921.—System for Controlling Moving Bodies By Radio Energy.

A scheme is described by means of which a moving body, such as a torpedo, may be steered by radio. The body carries an antenna system 20, 21, 22, 23, and 24, and has a plurality of receiver circuits 25 and 26. These circuits are tuned to different wave lengths, so that by radiating energy of the proper wave length from a distant point, it is possible to select which one of the two circuits may be rendered active. The device is so arranged that if circuit 25 is active, the body is caused to turn say to the right, while if circuit 26 is active, the body is caused to turn to the left. This result is accomplished by rapidly rotating switches 27 and 28, of which 27 is arranged to connect the circuits 25 and 26 alternately to the input circuit of a detector 35, 36, 39 and switch 28 is arranged simultaneously to connect the output circuit of the detector to relays 42, 43, so that when circuit 25 is connected to the detector, the relay 42 is also connected thereto; and on the contrary, when circuit 26 is connected then relay 43 is also connected. The movement of the switches is so rapid that the scheme is practically the equivalent of two separate detectors, each associated with one of the receiver circuits 25 or 26. Upon transmission of waves which renders say circuit 25 active, the relay 42 is energized, and this causes actuation of an electric valve 52 in the fluid cylinder 49, the piston of which is acted upon by fluid under pressure in tank 55 to move the rudder actuating bar 50. (Continued on Page 253)



Monthly Broadcast of Radio Newslets

R. R. Beal, chief engineer, Federal Telegraph Company, is in the Orient. Haraden Pratt is acting chief engineer during Mr. Beal's absence.

D. C. Marsh, until recently in charge of the Federal Telegraph Company's Washington, D. C., office and having the title of resident engineer, has been transferred to the Pacific Coast, where he will be attached to the engineering staff of the company in connection with marine and other radio duties.

W. E. Lufkin, formerly sergeant in the signal corps and past president of the San Francisco Radio Club, has been appointed assistant radio inspector for the sixth district. Because of his sympathetic understanding of the radio situation throughout the sixth district Sergeant Lufkin is well equipped for his new duties in which a host of friends join in wishing him all success.

The Federal Telegraph Company exhibited for one week in the rooms of the San Francisco Chamber of Commerce the Kolster radio compass and position finder. This equipment will shortly be installed on shipboard for the purpose of giving practical demonstrations at sea, after the conclusion of which, this development will be placed on the market for sale.

The official opening of the Radio Central station, New York, owned and operated by the Radio Corporation of America, was inaugurated November 5 by the transmission of a message from the President at the White House in Washington and its simultaneous reception at every radio station in the world.

The Olympia Radio Club has elected officers for the ensuing half-year term as follows: Edwin Wilson, 7ZP, president; E. O. Robbins, 7BZ, secretary-treasurer. J. Grant Hinkle was elected an honorary member by acclamation. Regular meetings will be held on the first and third Wednesday evening of each month.

St. John's Radio Club has been organized at Berkeley, Calif., with a charter membership of forty boys. Frank McCullough is president and chief operator. Gilbert Earle, vice president; Charles Clark, secretary-treasurer and John Peder, sergeant-at-arms. Meetings are held each Friday evening at 2640 College avenue, Berkeley, for code practice and arrangements have been made for monthly addresses on radio matters by a number of prominent radio men.

Complete success attending wireless transmission of handwriting now marks

the most advanced step in utilization of radio activity. Messages from General Pershing and Premier Briand, sent from the Belin laboratories in Paris, have been received and recorded in the handwriting of the senders at the United States naval radio station near Bar Harbor, Me. Practical use of the new invention is assured. Credit for its perfection largely is due Professor Edouard Belin, whose scientific research for many years has distinguished him as one of the foremost thinkers of the age.

The point to point radio stations recently completed by the Federal Telegraph Company at Portland and San Francisco were placed in commercial operation September 1. Three full duplex radio channels are now operated between these points. The company's Los Angeles station now under construction will be placed in operation about the first of the year. This station is also for point to point service, and when placed in commercial operation, will communicate with San Francisco, Portland and Seattle, operating three arc transmitters simultaneously.

Complete radiophone reports of the football game wherein the Oregon Agricultural College defeated the University of Washington at Corvallis were given students at Seattle. The Seattle Post-Intelligencer had a special telegraph wire between the football field at Corvallis and its radio broadcasting room at Seattle in charge of R. W. Bell. The Northern Radio and Electric Company installed a receiving set at the university in charge of H. S. Tenny. The telegraph reports from Corvallis were typewritten and then read into the transmitting radiophone by Mr. Bell.

G. E. Robinson, formerly 6AIH and now KOZR, reports hearing the Fairmont Hotel, San Francisco, radiophone, operated by Leo J. Meyberg, 800 miles north of Seattle on board M. S. Culbarra. Two stages of amplification were used. He also clearly heard the Hotel Oakland phone, Oakland, Calif., operated by P. D. Allen, 6XW, operated by Sergeant Travers at the Presidio, and 6XAC, operated by Colin B. Kennedy Co. at Los Altos, Calif. 6XG is the best all 'round, 6XW runs a close second, 6XAC is louder than either, but the modulation is no where near as good. 6XAJ I got good one night.

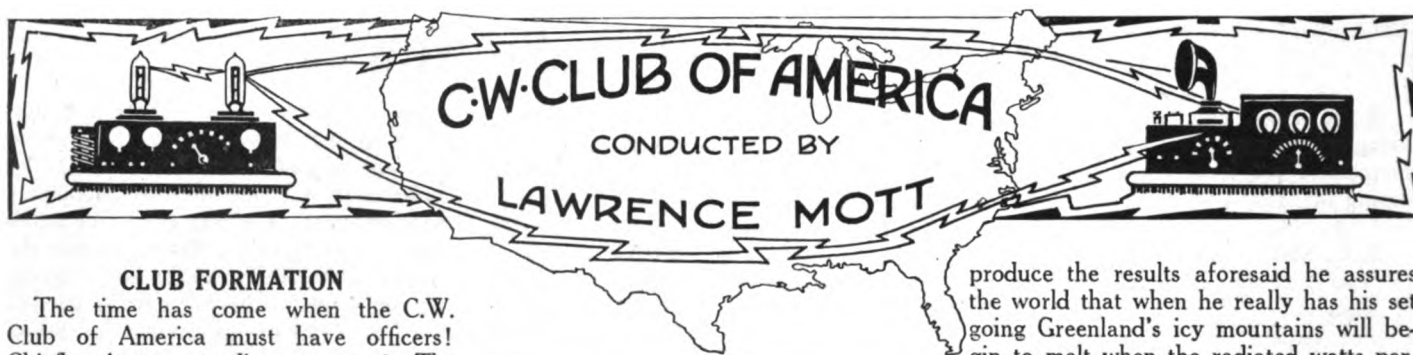
The amalgamation of all the clubs of the Pacific Northwest is well under way at present, although the name of the organization has not been decided on as yet. It has certainly been a hard job and

a slow one, too, since it was first proposed by the Radio Club of Tacoma, at their annual banquet in March, 1920. The constitution is being threshed out among the clubs now. The purpose of the amalgamation is to bring closer together the various clubs and to make better working conditions. The job will be finished in a few weeks now and radio will found with a new, fresh and snappy organization.

The Beach San Francisco radio station operated by the Federal Telegraph Company, call letters "KFS," maintains a continuous watch on 2400 meters CW and 600 meters spark and operates transmitters on both wave-lengths in communicating with ships at sea. This station is operated exclusively for ship to shore communication and is successful in maintaining a regular and reliable service with Federal arc equipped vessels, both Shipping Board and privately owned, up to distances of 5000 miles. Pacific Mail steamers now running between San Francisco and Baltimore are in direct touch with the Beach station from the time they leave San Francisco until they return.

Research work in transmitting wireless telephone impulses without antenna, has been undertaken by Sergeant R. C. Tavers of the United States Signal Corps radio school at the Presidio with the result that music and speech has been transmitted several hundred miles, clearly and audibly, without outside wires. Sergeant Tavers, in his tests, used small squares of copper netting suspended edge-down in his operating room. Using one as an aerial and the other as a capacity ground he was able on Sunday night, October 30, to transmit music to Bakersfield, Sacramento, Eureka and a considerable distance out to sea. The netting was used experimentally and worked beyond expectations.

A new record was received in wireless circles November 4 when 400 members of the California Alpine Club, at their annual outing and camp craft show in Rattlesnake Canyon on the slopes of Mount Tamalpais, danced to wireless concert music played from the Fairmont Hotel, the Presidio and Los Altos, California. The "tapping" of distant hotel orchestra and record music by radio was accomplished by means of a wire thrown into a tree. This, in conjunction with a four-step amplifier unit, enabled the hikers to receive their entertainment high up on the mystery mountain as loudly as though in a ballroom. The concert continued for several hours, each of the named stations contributing a special program for the event.



CLUB FORMATION

The time has come when the C.W. Club of America must have officers! Chiefly: A corresponding secretary! The associate editor of Radio has been enabled, thanks to the kindness of many radio friends, and C.W. enthusiasts, to start the interest in a club direction, and it is moving along nicely, with many applicants for membership, and a growing interest being shown from many quarters.

It is with regret that the associate editor cannot "stay with the job," but a variety of other important matters—chiefly having to do with a typewriter!—do not permit of his giving the time that is necessary to the answering of the hosts of inquiries, etc., that pour in on his defenseless head! He has done his best to "weather the gale" of paper, and to satisfy all inquirers! Think not too harshly of him.

It is therefore suggested that all C.W. men write to the editor—N. B.: NOT the associate editor!—and to him state their candidates for president and secretary. There being no dues involved, a secretary-treasurer is not needed.

The associate editor stands ready, at any time, to offer such advice as may be asked of him, but he very earnestly begs to be relieved of the responsibilities of the future directing of the C.W. Club of America, as it is growing beyond the time that he can give to it!

R. P. MacKenzie, 1016 Fourth avenue, Los Angeles, Calif., is Radio 6ALV and not 6ADU as previously reported.

The requests to join the C.W. Club of America are so numerous and insistent that I am compelled to arrange a new schedule—that will appear in the January issue. This will divide the week into three sets of nights—two each—and in this way I hope to accommodate all C.W. enthusiasts. It is the only way out of the present dilemma, as by adding more working times to the present schedule, the last men, each night, are working into the next day!

LAWRENCE MOTT.

The Pacific Coast record for C.W. transmission is about to be announced. The C.W. Club of America will award the leather medal with the wooden string to the winner in the near future. The lucky station is 6IZ of San Diego County, which has received cards from 9BP and 9AJA residing at Evanston, and Chicago, Ill., respectively. Both 9BP and 9AJA report C.W. signals from station 6IZ calling 8FQ on October 1, 1921. A representative of RADIO when interviewing 6IZ was assured that these results were as nothing compared with what will follow in the near future. 6IZ has been thinking about getting a C.W. set assembled and if the mere thoughts of getting one

produce the results aforesaid he assures the world that when he really has his set going Greenland's icy mountains will begin to melt when the radiated watts percolate. In the meantime 6IZ would like to know the brand of hooch responsible for the keen reception away back there in Illinois. He wants to know if the hookup is degenerative or whether they are using oscillating carborundums.

C. D. CLUB NEWSLETS

6ZB having completed the 20-watt panel set, is now busy with C.W. on 200 and 375, and gives regular concerts by phone Sunday and Thursday nights, 7-8 p. m. on 200 meters. The circuit used is a modified Hartley with Heissing modulation. For fone one oscillator and one modulator, are used, each 5 watts, and from one to four tubes in parallel for C.W. A.C. and electrolytic rectifiers are used for plate and filament. The spark set is used when needed for calling.

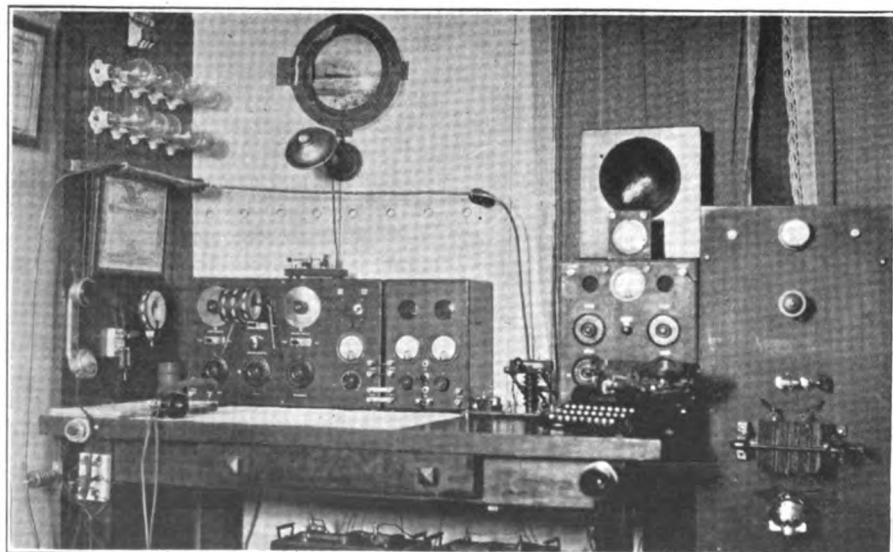
6AQA AT HOME

No, this set is not on shipboard, as you might suppose from the scenery with its cleverly camouflaged port-hole, but is situated in "The Palms" apartment at 421 West Adams Street, Los Angeles, Calif., where George C. Tichenor nightly hears stations in the seventh, fifth and ninth districts.

The receiver and two-step amplifier are of Mr. Tichenor's own design, but were built to specifications by the Western Radio Electric Co. This set is regenerative from 150 to 25,000 meters,—using a CR-5 circuit up to 600 and honeycomb coils for greater wave lengths. The detector is changed to either circuit by two anti-capacity switches. A "window" in the panel allows for easy access to the tube. As the picture shows, there are meters on each tube.

The key and antenna change-over switch are both mounted on a bakelite base. The main leads are half inch copper tubing, which is efficient, and also helps to give the set a commercial appearance.

The C.W. transmitter is of 10 watts output and allows the use of voice or buzzer modulation or straight C.W. The spark set consists of a home made transformer, Dubelier mica condenser, Wesrad O.T. and an Amrad quenched gap with fan as blower. The set is mounted on a half inch bakelite panel.



6AQA at Los Angeles, Calif.

DX-CW LISTENING CONTEST

In order to encourage tuning and listening for Continuous Wave signals, the Associate Editor will donate, each month, to the operator who correctly reports having heard him, from the greatest distance, ten dollars' worth of radio apparatus, said apparatus to be purchased from firms whose advertisements appear in the pages of RADIO. There are but two conditions to the attaining of the prize: 1. That the receiving operator give details of his receiving apparatus, and 2, that he quote from the QST that he hears.

U. S. Deputy Game Warden Lawrence Mott's station is 6XAD, situate at Avalon, Catalina Island, California—thirty miles distant from the mainland, with Los Angeles as the nearest large city.

Mr. Mott will QST each night, beginning December 1, at the following hours, and on these wave lengths:

10 P. M.—10:10 P. M.—375 metres, C.W.

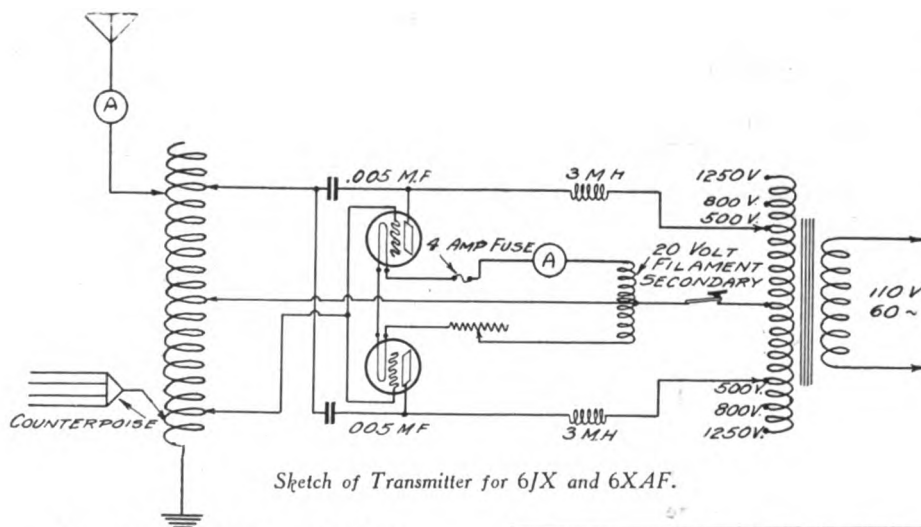
10:10 P. M.—10:20 P. M.—200 metres, I.C.W.

12 M.—12:10 A. M.—375 metres, C.W.

12:10 A. M.—12:20 A. M.—200 metres, I.C.W.

All reports received prior to the 8th of each month will be published in the next-following issue of RADIO, together with a description of the prize winning station. Photographs of contestant's stations will be published, if clear details are shown.

From 12:20 A. M. to 12:30 A. M. Mr. Mott will listen especially for DX signals, and will report these in RADIO.



Description of 6JX and 6XAF

Transmitting—Two 50 watt power tubes, with 500, 800 or 1250 volts 60 cycle a. c. on plates. Filaments operated on a. c. also. Hartley oscillating circuit used. Radiation varies from 1.8 amps on 500 volts plate to 4.1 amps on 1250 volts plate.

The details of transmitter are shown in accompanying sketch. Two different antenna inductances, one of 10 turns for 200 meters, and other of 30 turns for 375 and 450 meters, latter used when experimenting. Inductances are all Dubilier 4000 volt. All connections made with 385 strand Litz. All this apparatus will be permanently wired into a panel outfit as soon as a 300 watt Kenotron rectifying set is completed. Will then be able to use set for either telegraph as at present, or for telephone work.

A Kolster Type D. Decremeter is used to keep an accurate check on the wave length.

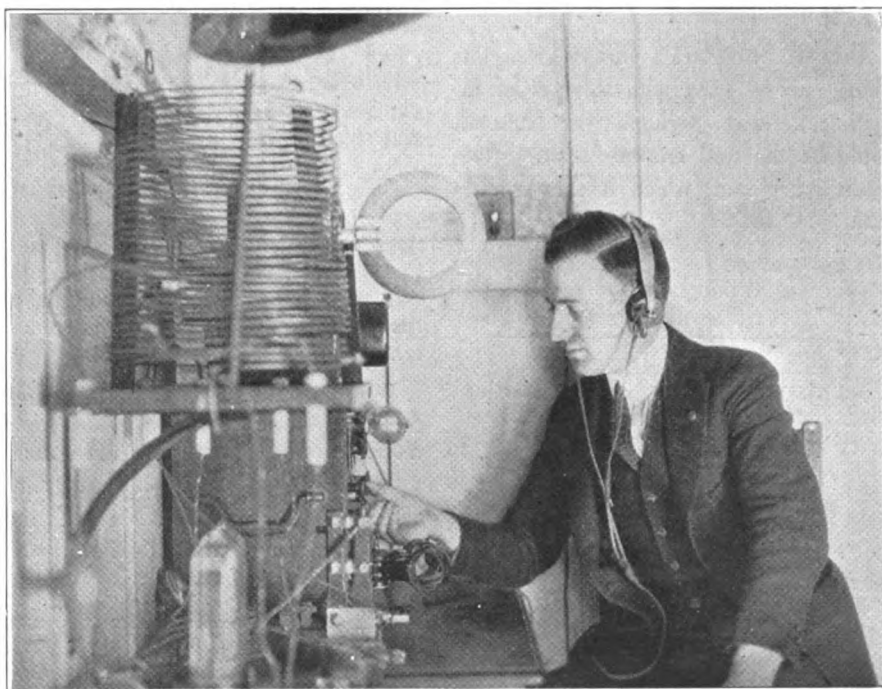
Receiving—A short wave regenerative receiver, not shown in the illustrations, is

occasionally used, but prefer flat wound Litz coil in honeycomb coil mounting, on regular receiving set, on account of flexibility. Receiver consists of detector and three stage amplifier, employing Western Electric tubes throughout, on 130 volts plate, and was entirely constructed by self. Detector uses well known Armstrong circuit, but amplifiers are of special design, to work with a Western Electric loud speaker. The set, which weighs 60 pounds, is considerably heavier than the average amateur amplifier, on account of the large number of choke coils, transformers and condensers necessary to produce distortionless transmission of music through three stages of amplification. Antenna consists of 8 wires of 7-18 phosphor bronze in form of inverted L, the mainmast being 55 feet high. The counterpoise is composed of 12 No. 10 B. & S. insulated wires, 8 feet above the ground and directly below the antenna. The antenna has a natural period of 165 meters and a capacity of .00058 m. f. Power input of a. c. transformer on transmitting set is 5 watts no load, 80 watts with both filaments running, and 410 watts with 1250 volts on plates and set radiating.

About distance worked, have received cards from five states, with reports of signals heard QSA. To date have not done much DX work on account of experimental work in progress, but expect to be on considerably this winter.

NEW MEMBERS C. W. CLUB OF AMERICA

Hugh Compton, 6AUB, 3369 28th street, San Diego, Calif.; Chas. W. Holdiman, 510 South Sixth street, San Jose, Calif.; Paul Socolovsky, 4BY, Loreburn, Sask., Canada.



Gerald M. Best, 6JX and 6XAF, Who Answers Queries and Replies on C. W. Practice. (See Next Page.)

Static Statistics from Everywhere

By Squawk McGuff

Rah! Rah! Rah!
Biff! Boom! Bah!

SEATTLE.

And now, my friends, I wish to announce that last, but not least, we have heard from the Totem City by the Puget Sound. They are vindictive souls—these Chinook warriors—and they wish it known to the pop-eyed world that they are alive and that when Tacoma and Portland take such cracks at their equipoise they have stirred up a community where the bald-headed eagles roost on the cuckoo clocks and the canary birds sing bass and the jack rabbits spit in the bull dog's eye. In other words, they are so tough that they scratch the enamel on the bath tub.

If you don't believe me, folks, just read the following letter and weep:

October 19, 1921.

Squawk McGuff,
Dear Sir:—

After digesting your page of this month's P. R. N. (future Radio) the Totem Radio Club has decided that Seattle was being left out of publicity really due her, but it is our own fault. We have not been asleep as you might think—as organizing 100 live, energetic members into a compact club is no joke.

But the look on that page of yours was enough to wake a dead fuse or a shot "B" battery. The only thing we saw about Seattle was: Tacoma says to Seattle, "Why all the high power for short distance work?" And in answer to that statement I might say that Seattle has some spark sets. You know it's pretty hard to get below 100 watts on a rotary, and, of course, that explains why Tacoma puts up a kick against Seattle; we ought to work on less wattage.

Seattle boasts over eight radio phones in operation, and quite a few "phones" coming up. One "phone," the P. I. radio-phone working on 1.3 amps., issues news bulletins from 9 to 9:30 p. m., along with the latest music. The P. I. phone is operated by the Northern Radio Company of Seattle. Another phone, 7XC, of the Northwestern Radio Company, gives concerts every night from 8 to 8:30, showing that Seattle hasn't been asleep.

The spark sets need not be mentioned, they speak for themselves.

As regards the Club: H. Mason, president; H. L. Jones, vice president; T. J. Bidner, secretary; E. R. Rebman, treasurer; S. G. Hagen, publicity agent.

If any more news is wanted of our Club, please write at the earliest possible moment and let me know when write-ups are to be in, Club news, etc. I am enclosing one of the write-ups in the Seattle

Times of Oct. 18, about the Totem Radio Club.

Yours very truly,
Sheldon Hagen, 7ON.

You tellum Seattle. We admire you fellows up there. Let's hear more about you please, and believe me, we will reserve the proper space on this little old page of fun (and otherwise) so that they may know from coast to coast, and then some, that the Totem Radio Club is actually a functioning organization. "73," MERRY XMAS.

LOS ANGELES

After the raise was over,

After the "feed" was done,
Brothers scraped mud off the wet walks,
As though it were excellent fun!

In course of time guy wires rust and become unsafe to those around the pole; therefore, 6EA and 6EB invited friends to assist in lowering the top section of a pole, it being 2x3 in size and 30 feet in length, to replace the rusty wires.

The day arrived, and also considerable rain, at times. 6ABG failed to come and afterwards, sent word by radio that he had a "cold"—and it was rather cold to get out of bed at that time, hi! But Mr. Foxley, chief op. at Edison Power Plant, and radio enthusiast, faithfully prepared to do or die; 6OL, also, as natty as one could wish; and 6KI, the good old stand-by, who helped put that pole up in 1812, was on hand as smiling as ever.

After consultation, they decided to go ahead. 6KI was highest on the pole and removed the bolts; 6EA was next below to receive and steady the pole and it was lowered without mishap for the new guys. It rained some more and when it was raised—say, fellows, you should have seen those on the adobe ground of a side hill, holding the guys—the neighbors thought they were practicing a new kind of sliding dance and were betting which could go furthest without coming down on all fours; but at last, it was over and they went into a warm room and a good, filling "feed," to talk for an hour or so, before separating.

The "Meteor Electric" went the limit for speed on Flower street and then disappeared in the "Pacific Radio," as to name, at 1108 W. Second street, but where it will be more luminous than ever. Already, the "Advance Electric" and "The Wireless Shop," were in the next block west and soon this may be known as Radio street, and when the tunnel is opened, a new crop of millionaires will likely spring up, like mushrooms, in the night. MERRY XMAS.

TACOMA

We notice an alarm clock in 7BA'S station which solves the mystery of why he starts calling DX stations at regular 3-minute intervals, who have not been on for the evening. It's a good thing that 7BA was not at the Chi banquet or Bessy would have been minus a "hot" drink. 7BA uses that stuff to oil his transmitter.

7BL is changing his location.

The Seattle P.-I. fone is very QSA, but someone had ought to donate him some new up-to-date records, also wish that they would give out news of the present day instead of a week old.

Tacoma noticed with much hilarity in the last RADIO the little note of exception Tacoma is given in the Portland traffic laws. We would like to ask our old friend Squawk if he is sure he did not misprint in one little place there. Instead of Tacoma being a "suburb" of Portland (being nearly 200 miles away) we thought maybe it should read, "Tacoma is the 'superb' of Portland."

I was down on a destroyer the other day chewing the fat with some of the ops. We were listening in to the various stations around 975 or 1000 meters when a noise somewhat similar to someone running their finger nails over a table top caused us to jerk off our fones in double quick time. I finally managed to explain to the excited ops that it was nothing wrong with old man either but was simply our old friend 7KM testing out his compressed victrola-record quench gap. I told the fellows all about Otto and his experiments and let me tell you, fellows, that even though we hear of Ott doing what is in our estimation "funny things," he is the boy that can work Portland, San Francisco or any of the eastern stations when we "wise birds" have to give up in despair. We visited Otto later on and managed to get a few snaps of his station. Things may be a little scattered around but there is a complete radio station before you and one of the best LD stations in the northwest.

Some of the brothers-in-swat claim I am getting worse but read the following I received from an anonymous source through the mails. It's a breach of etiquette to print anything that comes unsigned but this bird is so good here it is:

My Dear Squawk McGuff,

You ain't half crazy enuff

So I'm sending in sum stuff,

Hope it doesn't make u tuff.

BUCK SEZ:

The Raccoon runs the main line,

The 'Possum pulls the switch,

The Rabbit says, "Q R X, my friends,

My key hand has the itch."

Another long-standing record broken—Peterson dropped: "Rosie."

C. U. AGN NEXT MONTH.



With THE U-S-Radio Inspector

CONDUCTED BY MAJOR J.F. DILLON

A MONTHLY DEPARTMENT OF INFORMATION FOR OUR READERS



INSTRUCTIONS FOR CALLING

A number of cases have come to the attention of this office, in which it was very evident that amateur radio operators are either too lazy, or too careless to study the laws and regulations regarding calling, when using spark transmitters. The law requires that in calling the signal "KA" shall be made, once, the call of the station called three times, the letters "DE", once, followed by the call letters of the station calling three times. Nothing else, no finish, or other signal. In answering, the above procedure is followed, except that the station answering signs only ONCE, and gives the signal "K," meaning "go ahead."

I recently heard one amateur make the KA signal three times, the calls of the station he was calling three times, sign DE once (strange to say) and sign off his own call about five or six times, and then a series of strange noises followed, which sounded like the noises made by a loose wire, and the same foolishness was again repeated. All this for one call. If stations are near together, and there is very little doubt as to the called station's reception, it is permissible to call and sign off once, but a series of actions like those outlined above show either a careless disregard for the law, or an ignorant, green operator at the key—usually both. Brevity is essential in the transmission of radio signals today, in order there be as little interference as possible.

Radio telephone stations are quite at a loss to know how to call by voice, as it is obviously impossible to make the preliminary call signal, and all the conventional characters when calling. Until further and more definite instructions are issued, the following form is suggested for radio telephones. Assume Station 6XXX and 6YYY are to work, and that 6XXX wants to raise 6YYY, the conversation would be about as follows:

Call: "Hello 6YYY, hello 6YYY, hello 6YYY, 6XXX calling, 6XXX calling, 6XXX calling." (Station 6XXX only working.)

Answer: "Hello 6XXX, hello 6XXX, Hello 6XXX, 6YYY answering, all right, go ahead."

Business now to be transacted, each station giving his call letters, and the call letters of the station he is working with at the beginning and end of each transmission, unless working duplex.

The above is only suggested, and is not to be accepted as a hard fast rule, but should be followed generally, until more

explicit instructions are issued, covering the full details of radio telephone conversation, which will probably not be available for some time to come.

Respectfully,

D. B. McGOWN,
Assistant Radio Inspector.

R. Squire, 6AWG, 39 Granada street, San Francisco, closed for 30 days, starting October 24, 1921. Squire was warned to get down to 200 by this office in August, and did not do so. Was heard on 245 meters, and was given 30 days to think over whether or not he would obey the law.

CHANGES OF ADDRESS

R. A. Phillips, 6AHO, has moved from Moneta, Calif., to La Habra, Calif.

7XD is at the Billings Polytechnic Institute, Billings, Mont. Its listing in the old call book is erroneous and many cards have been therefore mis-directed. Prof. Glenn E. West is in charge.

R. M. White, 6OL, is now located at 1509 South Brand Boulevard, Glendale, Calif., instead of 717 East Windsor road, as previously reported.

Question: May I transmit with a spark coil providing I do not send outside of state or interfere with government stations?

Answer: No. You must obtain a license to use the spark coil.

New Sixth District Amateur Stations

6AWQ	J. W. Hadley	San Simeon, Calif.
6AWR	D. G. Hewitt	Box 596, Stanford University, Calif.
6AWS	H. D. Schmidt	383 Ocean St., Santa Cruz, Calif.
6AWT	B. Melinari	653 Union St., San Francisco, Calif.
6AWU	W. Stonerook	3702 Utah St., San Diego, Calif.
6AWV	C. H. Weatherhill	1509 G St., Reedley, Calif.
6AWW	L. Jones	Manteca, Calif.
6AWX	E. Sedlacek	267 W. Badello St., Covina, Calif.
6AWY	L. P. Bennett	428 B St., Hayward, Calif.
6AWZ	G. E. Gay	432 Linden Ave., Long Beach, Calif.
6BAA	Geo. W. Womer Jr.	5526 Telegraph Ave., Oakland, Calif.
6BAB	R. Lewis	31 Monte Ave., Piedmont, Calif.
6BAC	E. Miller	1645 American Ave., Long Beach, Calif.
6BAD	G. R. Martin	423 N. Curtis St., Alhambra, Calif.
6BAE	G. S. Morris	5132 Lincoln Ave., Los Angeles, Calif.
6BAF	G. L. Powell	375 Malino Ave., Long Beach, Calif.
6BAG	E. L. Ramer	2220 86th Ave., Oakland, Calif.
6BAH	V. E. Semran	940 So. Fair Oaks St., Pasadena, Calif.
6BAI	G. H. Dennis	Box 596, Stanford University, Calif.
6BAJ	H. M. Hines	1045 N. Stevenson Ave., Pasadena, Calif.
6BAK	R. Bunch	610 Pacific Ave., Santa Cruz, Calif.
6BAL	T. Howells	1777 Crystal Ave., Salt Lake City, Utah.
6BAM	F. L. Walker Jr.	Westwood, Calif.
6BAN	L. Vesper	2035 Alameda Ave., Alameda, Calif.
6BAO	James Kennedy Jr.	266 Carl St., San Francisco, Calif.
6BAP	W. F. Fredrick Jr.	670 Walsworth St., Oakland, Calif.
6BAQ	C. W. Smith	142 Shrader St., San Francisco
6BAR	C. Anderson	3732 Seneca Ave., Los Angeles, Calif.
6BAS	William L. Burnett	2039 Deakin St., Berkeley, Calif.
6BAT	Salesian Club	666 Filbert St., San Francisco, Calif.
6BAU	C. H. Rockwell	R.R. C. Box 205, Tulare, Calif.
6BAV	H. M. Hughes	1631 Dale St., San Diego, Calif.
6BAW	Myron Albertson	852 Westchester Place, Los Angeles.
6BAX	F. R. Welch	Hanford, Calif.
6BAY	F. Grant	234 Union St., Watsonville, Calif.
6BAZ	Mrs. Mary O. Houston	3420 Union St., San Diego, Calif.
6BBA	H. D. Graves	1454 S. Broadway, Chico, Calif.
6BBC	P. Borden	Brea, Calif.
6BBD	C. L. Worthley	1118A Barendo St., Los Angeles, Calif.
6BBE	C. K. Burns	1835 Bancroft St., San Diego, Calif.
6BBF	Thos. H. Howells	L. D. S. University, Salt Lake City, Utah.
6BBG	J. R. Harding	Hartman Bay Enterprise, Butte Co., Calif.
6BBH	E. A. Nielsen	115 So. 21st Ave., Phoenix, Ariz.
6BBI	A. H. Schmith	Main St., Battle Mountain, Nev.
6BBJ	A. F. Miller	1328 18th St., Santa Monica, Calif.
6BBK	J. Gilleran Jr.	222 W. San Carlos St., San Jose, Calif.
6BBL	R. A. Naja	479 34th Ave., San Francisco, Calif.
6BBM	M. A. Hawkins	2850 19th Ave., San Francisco
6BBN	K. Dilks	1326 W. 16th St., Los Angeles, Calif.
6BBO	H. E. Chambers	780 Rialto Ave., Pasadena, Calif.
6BBP	J. C. Hooton	R. F. D. No. 1, Los Gatos, Calif.
6BBQ	F. Mack	194 S. El Belino Ave., Pasadena, Calif.
6BBR	W. E. Carman	165 Lincoln Way, Auburn, Calif.
6BBS	T. L. Up de Graff	1450 San Pasqual St., Pasadena, Calif.
6BBT	K. Walton	418 Second Ave., San Bernardino, Calif.
6BBU	E. Knorr	134 E. Center St., Covina, Calif.
6BBV	F. Pollard	200 W. Badillo St., Covina, Calif.
6BBW	W. C. Milhouse	429 S. Painter Ave., Whittier, Calif.
6BBX	C. Stewart	Fifth St., San Rafael, Calif.
6BBY	A. Penrose	210 University Ave., Los Gatos, Calif.
6BBZ	F. Anderson Jr.	466 Campus Ave., San Bernardino, Calif.
6BCA	G. Wilson	3635 11th St., San Jose, Calif.
6BCB	R. H. Speck	Upland, Calif.
6BCC	S. M. Roycroft	114 N. Isabel St., Glendale, Calif.
6BCD	G. H. Simpson	Box 130, Salida, Calif.
6BCE	V. M. Ashworth	174 N. 1st St., Provo, Utah.

Questions and Answers

By the Radio Inspector

Question: What are the requirements for passing an examination for a radio phone? G. E., Berkeley, Cal.

Answer: Exactly the same rules and regulations apply to telephone sets as to telegraph, viz.: The application must pass the regular amateur examination, including the ten word code speed test, and written examination, and must make application for station license in the usual manner after the operator's license has been obtained.

Question: I am licensed for a spark set which I have and want to do some C. W. experimenting on the side. If C. W. proves satisfactory I may change to it but do not want my license to be changed for C. W. as I do not know whether I will permanently use it. I intend to keep the spark set. Will my license be subject to cancellation or suspension if I do not have it changed? I do not care to have my license changed every time that

I desire to use a spark instead of C. W. J. K., San Jose, Calif.

Answer: You may not operate the CW set without authority, as unless it is designated in your license, or unless you have notified the office and received permission to use it, you would be working without a license. If you notify the office that you are going to make this change, and send the license back for correction, the use of CW will be authorized as well as the spark set now installed. This would allow you to experiment on either CW or spark, under the usual restrictions of an amateur license.

Question: I have a CW set that will not operate on a wave length below 325 meters, although I have tried all sorts of schemes to make it go down to 200. Can I, therefore, get a special license. I wish to use it for general amateur communication. K. M., San Francisco, Cal.

Answer: No. This does not constitute any grounds for a special license of any kind. Your attention is directed to Par. 63 of the Radio Laws and Regulations: "... a special license will be granted only if some substantial benefit to the art or to commerce aside from individ-

idual amusement seems probable." Furthermore, even if you had the special license, you would not be allowed to use the special wave for general communication among amateurs. Special amateur stations are granted certain wave lengths differing from those assigned to other stations for specific purpose. These stations are only allowed to communicate with other special stations of the same class **ON THE SAME WAVE LENGTH.** For general amateur communication, you would be required to have and use the 200 meter wave. It seems probable, that if you would cut your antenna in half that you would get down all right.

Question: Please inform me of the number of words per minute that I must copy in order to pass the various grades for commercial examination. B. Y., Los Angeles, Calif.

Answer: All examinations include sending and receiving, as follows:

Commercial Extra First Class—25 American Morse and 30 Continental Morse.

Commercial First Class—1st grade, 25 words per minute.

Commercial First Class—2nd and 3rd grades, 20 words per minute.

Commercial Second Grade—1st grade, 25 words per minute.

Commercial Second Class—2nd grade, 20 words per minute.

Commercial Second Class—3rd grade, 12 words per minute.

Question: I hold an amateur first grade license at present and desire to get a commercial license. The amateur license does not expire for about a year. Is it necessary for me to wait until the present license expires before I can take a commercial examination? How long must a person hold an amateur license before he can take the commercial examination? C. M., Oakland, Cal.

Answer: Not necessary to wait for expiration of the amateur license. Holding of an amateur license has no bearing on the holding or applying for a commercial license, except that no one can hold two licenses at the same time. If you hold a commercial license of any grade or class this will suffice for operation of any amateur station.

Question: I have had 24 months on a commercial SECOND grade license. Can this apply to the 18 months experience required for the commercial first class first grade? This was all on merchant ships. J. L. N., San Pedro, Cal.

Answer: No. The regulations state: "First Grade—A year or more satisfactory commercial service **IN THE SECOND GRADE—**" and for second grade "Six months or more satisfactory commercial service **IN THE THIRD GRADE.**" You would be eligible for the Second Class First Grade in your case, but not for the First Class, as your service was not on a license of proper grade.

New Sixth District Amateur Stations

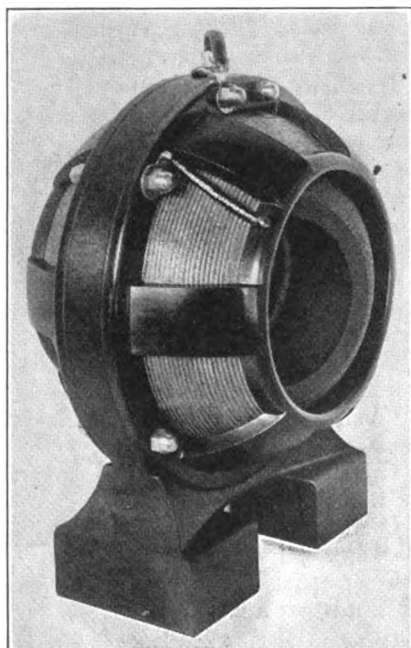
6BCF.....	John Fishback.....	20 N. Greenwood St., Pasadena, Calif.
6BCG.....	Wm. A. Bryan.....	First Ave., Upland, Calif.
6BCH.....	Wm. Rosenthal.....	176 15th Ave., San Francisco, Calif.
6BCI.....	D. Skilling.....	2960 Linden Ave., Berkeley, Calif.
6BCJ.....	E. Salmina.....	St. Helena, Calif.
6BCK.....	A. J. Nachbaur.....	Vallejo, Calif.
6BCL.....	C. Bluffum.....	116 20th St., Monterey, Calif.
6BCM.....	G. R. Harris.....	Carolina St., Vallejo, Calif.
6BCN.....	H. Hutchinson.....	121 W. Center St., Covina, Calif.
6BCO.....	L. S. Green.....	Gridley, Calif.
6BCP.....	E. Atmore.....	R. F. D., Box 38, Santa Paula, Calif.
6BCQ.....	E. R. Hog.....	Mt. Wilson Observatory, Mt. Wilson, Calif.
6BCR.....	C. Foreman.....	1714 Alameda Ave., Alameda, Calif.
6BCS.....	J. Windley.....	Market St., Manteca, Calif.
6BCT.....	A. T. Lenoir.....	1330 E. Pierce St., Phoenix, Ariz.
6BCU.....	H. Bidwell.....	San Marcos, Calif.
6BCV.....	W. J. Robinson.....	2318 Santa Clara St., Alameda, Calif.
6BCW.....	F. T. Remer.....	231 Magnolia St., Modesto, Calif.
6BCX.....	O. S. Schlenker.....	2915 Magnolia St., Oakland, Calif.
6BCY.....	D. Dart.....	1315 Tamalpais Road, Berkeley, Calif.
6BCZ.....	H. Hadley.....	74 Henry St., San Francisco, Calif.
6BDA.....	H. Frank.....	1465 McAllister St., San Francisco, Calif.
6BDB.....	Osmund Stone.....	1831 Balboa St., San Francisco, Calif.
6BDC.....	W. W. Schmidt.....	605 19th Ave., San Francisco, Calif.
6BDD.....	S. Glasen.....	2319 Ashby Ave., Berkeley, Calif.
6BDE.....	W. A. Huber.....	1603 San Bruno Ave., San Francisco, Calif.
6BDF.....	E. Hendrickson.....	2036 7th Ave., Oakland, Calif.
6BDG.....	W. F. Betts.....	1533 19th St., Santa Monica, Calif.
6BDH.....	I. W. Eisenberger.....	105 N. Fourth St., Alhambra, Calif.
6BDI.....	D. Wright.....	Box 125 R. F. D., Glendora, Calif.
6BDJ.....	A. Clapper.....	141 E. Center St., Covina, Calif.
6BDK.....	C. Gutte.....	1034 Goshen Ave., Visalia, Calif.
6BDL.....	W. D. Cheney.....	2723 Benvenue Ave., Berkeley, Calif.
6BDM.....	J. R. Evans.....	Riverbank, Calif.
6BDN.....	G. S. Clark.....	P. O. Box 383, Bishop, Calif.
6BDO.....	M. C. Starkey.....	Taft, Calif.
6BDP.....	H. M. Williamson.....	674 6th St., Hollister, Calif.
6BDQ.....	T. L. Mayes.....	Coalinga, Calif.
6BDR.....	W. H. Baird.....	Fellows, Calif.
6BDS.....	L. J. Wren.....	911 13th St., Modesto, Calif.
6BDT.....	W. S. Shin.....	1941 Funchal Lane, Honolulu, T. H.
6BDU.....	Pacific Radio School.....	75 New Montgomery St., San Francisco.
	(R. Tinker)	
6BDV.....	B. F. Zinser Jr.....	810 W. 48th St., Los Angeles, Calif.
6BDW.....	D. C. Helsey.....	232 N. Gower St., Hollywood, Calif.
6BDX.....	J. De Laney.....	367 E. 57th St., Los Angeles, Calif.
6BDY.....	H. Ramer.....	4547 Cleveland Ave., San Diego, Calif.
6BDZ.....	A. E. Barnes.....	1901 Oxley St., So. Pasadena, Calif.
6BEA.....	W. L. Evans.....	241 N. Hollenbeck St., Los Angeles, Calif.
6BEB.....	R. A. Reed.....	1800 Third St., San Diego, Calif.
6BEC.....	C. R. Noren.....	6016 York Blvd., Los Angeles, Calif.
6BED.....	C. H. Smith.....	126 Anza St., San Francisco, Calif.
6BEE.....	C. J. Hansen.....	3454 Percy St., Los Angeles, Calif.
6BEF.....	H. D. Hicks.....	3327 Jefferson Ave., San Diego, Calif.
6BEG.....	J. P. Weathers.....	1221 Trenton St., Los Angeles, Calif.
6BEH.....	B. E. Edwards.....	515 Sinclair St., Reno, Nev.
6BEI.....	C. D. Thomas.....	2801 La Salle Ave., Los Angeles, Calif.
6BEJ.....	F. McCullough.....	3161 College Ave., Berkeley, Calif.
6BEK.....	H. R. Green.....	1814 So. Vermont St., Los Angeles, Calif.
6BEL.....	J. P. Blindbury.....	618 Bushnell St., Alhambra, Calif.
6BEM.....	K. Kawachi.....	R. F. D. 1, Box 463B, Gardena, Calif.
6BEN.....	E. Bradford.....	Lost Hills, Kern Co., Calif.
6BEO.....	J. R. Winn.....	417 Ocean Front St., Venice, Calif.
6BEP.....	R. Julian.....	1260 E. 4th St., Long Beach, Calif.
6BEQ.....	G. H. Rufener.....	410 W. Santa Barbara Ave., Los Angeles.
6BER.....	T. Newman.....	4130 Bachman Place, San Diego, Calif.

New Apparatus and Supplies from the Radio Manufacturers

NOVEL GREBE MOULDED VARIOMETER

Among the many interesting improvements included in the latest types of Grebe radio apparatus is a moulded variometer of novel design.

This variometer consists essentially of five moulded bakelite pieces; a frame, two skeletonized cages for supporting the



New Grebe Variometer.

stator windings, and two half balls which make up the rotor. The cages containing the stator windings are bolted to the frame, while the rotor is assembled on the shafts. It is claimed the design of this unit reduces dielectric losses to insignificance, and that the extreme accuracy and constancy of dimensions gives a more stabilized design than would be possible with any other form of variometer.

A 2 K.W. VACUUM TUBE SET FOR PANAMA

A 2 K.W. radio tube transmitter, now installed and in operation at Almirante, Panama, has recently been completed by the General Electric Company for the Radio Corporation of America. Not only is this transmitter unusually powerful for a tube transmitter, but it was designed and built in record time, being finished, tested, and ready for shipment three months after receipt of the order.

The set consists essentially of equipment designed to supply direct current at 12,000 volts for the plate supply of the radiotron tubes, and for converting this power into radio frequency. Power is supplied to the transmitter at 440 volts, single phase, 60 cycles, and stepped up to

high voltage by means of a transformer, the output of which is fed into the rectifying system.

The rectifying system consists of two K.W. Kenetron tubes which supply 12,500 volts d. c. to the plate circuits of the radiotron generators. The ripple in the output of the rectifying system is smoothed out by means of a suitable filter system. The radio frequency power is generated by a system consisting of two 1 K.W. radiotrons with the necessary grid and plate coils, together with an antenna loading coil. Provision is made for controlling the power by a power change switch which alters the voltage on the primary of the plate transformer. The filaments of all tubes, Kenetrons and radiotrons, are operated on a.c. through transformers which step the supply voltage down to the operating voltages of the filaments.

The set is equipped with a wave changing switch which, by a single operation, changes the transmitted wave to any one of three lengths—600, 1,000 and 3,000 meters. The switch automatically selects predetermined points on the loading, plate and grid coils. Provision is also made for transmitting on interrupted continuous (ICW) as well as on continuous waves (CW). This is accomplished by means of a motor-driven interrupter in the grid circuit of the radiotron tubes, which starts and stops oscillations in the antenna at audio frequency, approximately 1,000 interruptions per second.

The rating of the transmitter is based on the power input of the antenna circuit, instead of on the output of the power equipment as is usual with spark transmitters. The rating of the tube transmitter is the product of the antenna resistance times the antenna current squared, equalling two kilowatts. While it cannot be predicted exactly what the range of this set will be, it is expected that it will equal if not exceed, the range of a 50 K.W. spark transmitter. As an example of its initial effectiveness, the set is now carrying on reliable and most satisfactory communication from Almirante, Panama, to New Orleans, La., not only at night but during the daylight period as well.

TRADE NOTES

Somerville Radio Laboratory, Boston, Mass., has issued a new illustrated price list of radio apparatus for the use of the amateur operator.

Atlantic-Pacific Radio Supplies Co., San Francisco, are distributing a revised list of prices on DeForest radio apparatus illustrated and described in Catalogues F, G, S-21 and S-22, which show the new DeForest CW equipment and parts.

Herbert E. Metcalf, publicity manager for the Magnavox Company, is instructor for the radio course offered by the Extension Division of the University of California in the Pacific Building, San Francisco, every Monday night.

H. S. Tenny, formerly chief electrician U. S. navy in the Adriatic service, and frequent contributor to these columns, is now manager Northern Radio & Electric Co., 418 Union street, Seattle, Wash.

Frank A. D. Andrea, New York, has issued an attractive new catalogue of Fada radio instruments and parts, including crystal detectors, vacuum tube detectors, amplifiers, rheostats, switches and transformers.

The Formica Insulation Co. has won the suits brought against it by the Westinghouse Company and the Continental Fiber Co. for alleged infringing patents for making and molding laminated articles.

F. Clifford Estey, president and secretary of the Essex County Radio Association of Radio Clubs in Essex County, affiliated with the American Radio Relay League, has become associated with the Clapp-Eastham Company, Cambridge, Mass., as sales manager. Mr. Estey will direct all sales and advertising work for the C-E line of radio equipment and electrical laboratory apparatus.

Mr. A. E. Evans, formerly of the Western Wireless Works, and Mr. J. L. Sabo, formerly with the Independent Wireless Telegraph Company as radio inspector, have opened a radio supply store at 1972 San Pablo avenue, Oakland, Cal. The new concern will be known as the Evans & Sabo Company. The Western Wireless Works has been absorbed by the newly founded concern. A complete line of all the standard makes of radio equipment will be carried in stock. Manufacturing of radio apparatus will be carried on to a large extent. A new type of 2 K. W. break key, high tension condenser, receiving equipment, etc., will be manufactured.

Radio men of San Francisco and bay cities will be glad to learn that Ben Linden, who was the Radio Inspector in charge of the sixth district during the war period, is now in charge of San Francisco's newest radio store, doing business under the name of Warner & Linden. The store was opened for business on November 1st, at 350 Market street. A complete line of all the standard makes of radio apparatus will be carried in stock. Mr. Warner has conducted a radio store for many months in Oakland, California, under the name of Warner Brothers.

CALLS HEARD

CALLS HEARD BY 6ABJ, E. R. SHARPE, MARTINEZ, CALIF.

(6AK), (6AV), 6BJ, 6BX, 6CH, 6CU, (6CV), 6DN, 6DY, 6FH, 6FI, 6FP, (6GR), (6GX), 6HC, (6IC), 6IG, (6IM), 6LA, 6LH, 6OG, 6ZE, 6ZU, (6ZX), 6AAM, 6ABC, 6ABE, 6ABH, 6ABP, 6ABW, (6ABX), 6ACM, 6AEG, (6AEW), 6AFN, 6AID, 6AJF, (6AGA), 6ALA, 6ALL, 6ALV, 6ALR, (6AMM), (6AMW), 6ARH, 6AWF, 6AVN, 6AVM, 6LA, 7MP, 7XD.

The above stations were heard with one step of amplification. All QSA. Anyone hearing 6ABJ please QSL.

HEARD AT 7XD, BILLINGS POLYTECH- NIC INSTITUTE, BILLINGS, MONT.

Sept. 1-Oct. 1, 1921

5HK, 5LA, 5ZA, 6ABX, 6AEQ, (6AEZ), 6AFT, (6AIB), 6AIZ, 6ALEC.W., 6APE, (6ATQ), (6AWH), 6AXC.W., (6CV), 6FI, (6GR), 6IC, (6OT), 6WV, 6XG, (6ZU), 6ZM, 6ZS, (7HM), (7HW), (7IM), (7LY), (7OZ), 7UT, (7XQ), 7YA, 7ZE, (7ZG), (7ZJ), 7ZK, (7ZM), 7ZN, (7ZO), 7ZR, (7ZS), (7ZT), 8XAD, 9ABU, (9AEG), 9AEY, 9AFW, 9AGN, 9AMC.W., 9AMBC.W., 9ANF, 9ANK, 9AOU, 9ARZ, 9ASF, 9AYA, (9AYS), 9DLJ, 9DSG, 9DUD, (9EE), (9HM), 9HT, 9HW, 9JN, 9LC, 9LF, 9OE, 9OI, 9PN, 9PS, 9STK, 9XW, (9YAK), 9ZA, 9ZAC, 9ZC, 9ZN, 9ZUG, 9ZYC.W.

CALLS HEARD BY KOZR (FORMER 6AIW OF ROSEVILLE), IN BELLING- HAM, WASH.

9:30 to 11:30 P. M., Oct. 7, 1921

6AK, 6DP, 6EB, 6CH, 6GF, 6IC, 6OC, 6TU, 6GR (very QSA), 6AAT (C.W. QUD), 6GP, 6ALE (C.W. QSA very), 6AEZ, 6VK, 6XAJ (Oakland Hotel Concert), 7BK, 7CC, 7IW, 7MA, 7MP, 7KJ, 7YJ, 7YO, 7XD, 7JS, 7YL, 7ZM (QSS bad), 7YA, 7ZU.

STATIONS COPIED BY 6ASB (D. V. RUS- SELL), BREA, CALIF.

Sept. 18-Oct. 18, 1921

5ZA, 6AK, 6AL, 6CH, 6CV, 6CY, 6DS, 6FH, 6FK, 6GI, 6GM, 6GP, 6GR, 6GS, 6GT, 6IC, 6IM, 6IV, 6JE, 6KC, 6KS, 6KY, 6MD, 6MS, 6OC, 6OD, 6OG, 6OL, 6PJ, 6PO, 6QR, 6RF, 6SK, 6UP, 6WR, 6ZX, 6XD (phone and music), 6ZB, 6ZR, 6ZU (C.W.), 6ZZ, 6AAG (C.W. and phone), 6ACY, 6AFU, 6AIF, 6AIM, 6ALP, 6ALU, 6ARP, 6AUD, 6AWH, 6XAK (C.W. and phone and music), 7MF, 7IF, 7XD, 7ZD, 7BF. Stations at least 25 miles away.

CALLS HEARD BY 6AME, BOX 218, RIVERBANK, STANISLAUS CO., CALIF.

From Sept. 21-October 21, 1921

Heard on one-tube and honeycombs. All signals at least fairly QSA. Spark stations: 5ZA, 6AB, 6AF, 6AG, 6AN, 6AR, 6AN, 6AX, 6CH, 6CS, 6CV, 6EB, 6ED, 6EG, 6EN, 6ER, 6FC, 6FH, 6FK, 6FS, 6FT, 6GB, 6GI, 6GL, 6GP, 6GT, 6GX, 6HC, 6HY, 6ID, 6IG, 6IM, 6IN, 6IS, 6JE, 6JC, 6KA, 6KC, 6KH, 6KM, 6KP, 6KS, 6LB, 6LU, 6MF, 6MH, 6MZ, 6NC, 6OD, 6OE, 6OL, 6OY, 6QR, 6RB, 6RD, 6RF, 6RR, 6RT, 6SC, 6SK, 6ST, 6SU, 6SV, 6TF, 6TG, 6UO, 6VY, 6XX, 6ZB, 6ZU, 6ZR, 6ZS, 6ZX, 6ZZ, 6AAH, 6AAT, 6AAN, 6ACY, 6ADL, 6AEZ, 6AGF, 6AGG, 6AGH, 6AGL, 6AIB, 6AID, 6AIO, 6AIP, 6AJE, 6AJH, 6AKL, 6ALU, 6ALP, 6AMI, 6AMN, 6APH, 6ARK, 6ARW, 6ATF, 6ATQ, 6AVB, 6AVD, 6AWK, 7AC, 7BJ, 7CK, 7DB, 7DW, 7ED, 7FI, 7GA, 7GR, 7IC, 7IM, 7IN, 7IV, 7IW, 7JU, 7KB, 7KJ, 7KG, 7LT, 7MA, 7MF, 7MP, 7MU, 7NA, 7NR, 7NW, 7OZ, 7QO, 7RM, 7RU, 7RW, 7TJ, 7VO, 7XD, 7XJ, 7XM, 7YJ, 7ZB, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZS, 7ZT, 7ZU.

Additional spar stations heard with sun shining: 6AC, 6AK, 6AM, 6FH, 6GC, 6GF, 6GR, 6HF, 6HX, 6IC, 6KW, 6OC, 6TU, 6UF, 6VM, 6AAJ, 6ABX, 6AEI, 6AFN, 6AJD, 6AJU, 6AJW, 6ALW, 6ATF, 6ANB.

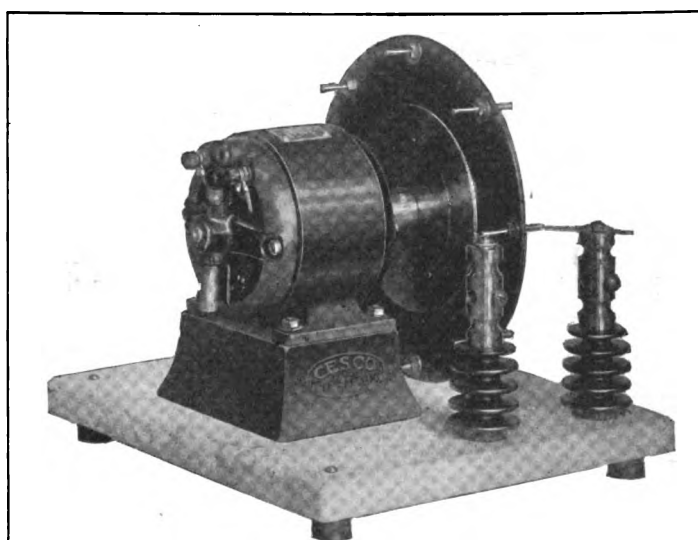
C.W. stations: 5ZA, 6AT, 6AV, 6EF, 6EN, 6ME, 6RA, 6WV, 6XR, 6ZA, 6ZN, 6AAT, 6AHC, 6AIO, 6ALE (day), 6ALU, 6AQT, 6ARF, 6ART, 6AWE (day), 6AWC (day), 6AWH, 6AWV, 6XAC, 6XAD, 7XF, 9AMB.

Phone stations: 6AK, 6FI, (day), 6XD, 6XE, 6XG (day), 6XW, 6AWY (day), 6XAC (day), 6XAK, Hotel Oakland. (6?) 7XF and 9 (?)AF. (Reynolds Radio Co., Denver, Colo.)

SPECIAL

Christmas Sale of Radio Apparatus

To reduce our large stock before taking annual inventory, we are offering the following equipment and apparatus to you at 25% to 75% per cent less than the regular price. Every piece new. Every piece standard. Every piece guaranteed. On many items you save more than half. Check over the list carefully, then send in your order AT ONCE, so we can supply you before we are out of what you want.



CESCO \$75 ROTARY GAP FOR \$40

Cesco Type R300 Rotary Spark Gap with Westinghouse 1/4 H.P., 3450 R. P. M., induction type motor. The disc is of bakelite 9 inches in diameter with 12 revolving electrodes. Gives beautiful, clear penetrating note that is readable through static and interference. Mounted on gray marble, brass parts highly nicked, and beautifully finished. Regular price \$75. SALES PRICE \$40.

DeForest CV 500-.0005 Condensers	\$ 3.70
DeForest LC 101 Coil Mounting.....	9.25
DeForest P 300 Detector and 1 Stage Amplifier.....	40.00
DeForest T 200 Tuner	50.00
DeForest P 100 Audion Control	35.00
Kennedy Long Wave Receiver	100.00
Kennedy Three Stage Amplifier	50.00
Kennedy Two Stage Amplifier	35.00
Radio Shop Short Wave Regenerative Set.....	25.00
Clapp Eastman Balanced .001 Condensers	2.85
Clapp Eastman Balanced .0005 Condensers	2.25

Be sure to mail orders at once.

CALIFORNIA ELECTRIC SUPPLY CO.

643 Mission Street, San Francisco

Radio Supplies That R Right

Say Radio to the Advertiser, it will help you.

WITH A BED SPRING AS AN AERIAL FLORIDA TO CALIFORNIA

READ THIS

Mr. Proudfoot—I received your plug several days ago, and I thank you very much. The amplifier which I purchased from you certainly does work well. I am able to read NPL using my bed-spring as an aerial with only one step of amplification. Thanking you very much for your courtesy, I remain, very truly yours,

CHARLES CROWLEY, Box 386, Clearwater, Fla.

READ THIS



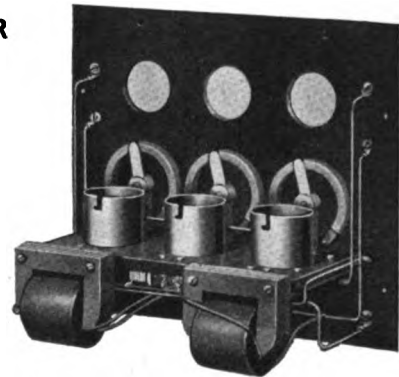
DETECTOR AND TWO-STEP AMPLIFIER

\$35.00

Highest Quality Lowest Prices

is duplicate of above only one unit less

Detector and One-Stage Amplifier
\$25.00



LOUDEST AND CLEAREST SIGNALS

Made possible by SPECIAL DESIGN—(Different ratios of winding in transformers in each step of amplification.) The smoothest working rheostat—inlaid resistance units, do away with ugly screw heads in panel. Very sensitive adjustment.

Panel 3/16 in. hand rubbed and engraved with white letters. Instruments look better than photographs. Cabinet 5 in. deep. Bakelite is 7½ in. x 8¾ in. Plug for fones furnished with each instrument.

\$35.00

The Operating Characteristics of All Our Instruments Are Equal to Any on the Market Regardless of Price.

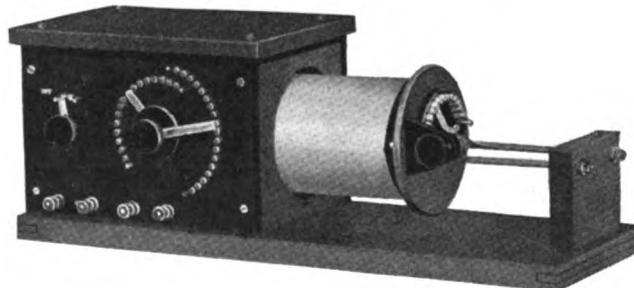
CABINETS
QUARTER SAWED OAK
WITH WAX FINISH—
MAHOGANY FINISH
IF DESIRED
* * *

NOTICE
CLEAN CUT WIRING
* * *

MANUFACTURERS' PRICE
Instruments being sold direct from Manufacturers to you—thus saving you 30 to 40%.

This instrument has a range of 140 to 3500 meters, base of 18 by 6 inches and wire of green silk covered copper. The metal is a polished nickel and the woodwork is a fine hand rubbed mahogany finish. Panel 9/32 inch hard rubber.

NAVY TUNING COUPLER



ALL INSTRUMENTS
TESTED IN LABORATORY
AND
UNDER WORKING
CONDITIONS
* * *

EVERYTHING
GUARANTEED
* * *

**MONEY BACK AFTER
3 DAYS**

If you are not satisfied as represented. The primary has 16 spaced taps, 18 single taps, along with 12 taps in secondary and dead end switch shown at left in panel, makes this instrument reliable for experimental work in schools and laboratories.

so that a very fine tuning can be obtained. This feature

361 E. OHIO STREET

G. M. PROUDFOOT

CHICAGO, ILLINOIS

We manufacture our own jacks, which allows shortest connections possible and more permanent construction than with telephone jacks. Automatic filament control by plug, \$10.00 additional.

THE BLANK RADIO CALL BOOK

(For Amateurs)

A Wonderful Help to All.

An Absolute Necessity to the C. W. Man.

IF YOU HAVE A BLANK PAGE LIKE THIS PRINTED IN BRILLIANT RED:—

Station	Coupling	Primary	Grid Var.	Plate Var.	Location	Notes
AA						
AA						
AA						
AB						
AND FILL IT IN LIKE THIS—YOU'LL KNOW WHERE TO FIND HIM NEXT TIME						
Station	Coupling	Primary	Grid Var.	Plate Var.	Location	Notes
AA	20%	12 turns	40%	32%	170 MI. North	CW-QSA-Worked Oct. 16
AA						
AA						
AB						

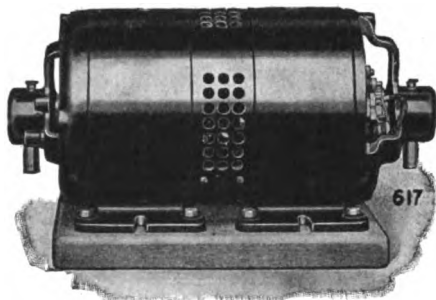
A place for your instrument readings for 4500 stations. Adaptable to any receiver columns left blank can be used in connection with a receiver of any design. Durable cover. Pages 8x11 on paper which will stand repeated erasure. \$1.50 will bring this new station help to you by return mail.

F. M. Ende, Publisher, Fort Riley, Kansas

Say Radio to the Advertiser, it will help you.

C. W. for Christmas

—Make a Good Start
with your Christmas
Money—A Few
Suggestions



ROBBINS & MEYERS, MOTOR GENERATORS AND GENERATORS FOR C.W.

100 V. A. C. 500 V. D. C.

100 watts output 1750 R.P.M. \$74.75. Ship. wt. 95 lbs.
200 watts output 1750 R.P.M. 89.80. Ship. wt. 120 lbs.
200 watts output 3400 R.P.M. 79.00. Ship. wt. 95 lbs.

110 V. A. C. 1000 V. D. C. (Double Commutator)

200 watts output 1750 R.P.M. \$197.40. Ship. wt. 185 lbs.
200 watts output 3400 R.P.M. 181.40. Ship. wt. 150 lbs.
500 watts output 1750 R.P.M. 271.00. Ship. wt. 275 lbs.
500 watts output 3400 R.P.M. 208.80. Ship. wt. 220 lbs.

Generators Only, Belt Driven, With Pulley—500 Volts

100 watts output 1750 R.P.M. \$42.00. Ship. wt. 50 lbs.
200 watts output 1750 R.P.M. 50.60. Ship. wt. 65 lbs.
200 watts output 3400 R.P.M. 44.00. Ship. wt. 50 lbs.

1000 Volts (Double Commutator)

200 watts output 1750 R.P.M. \$77.60. Ship. wt. 65 lbs.
200 watts output 3400 R.P.M. 98.20. Ship. wt. 80 lbs.
500 watts output 1750 R.P.M. 145.60. Ship. wt. 140 lbs.
500 watts output 3400 R.P.M. 98.20. Ship. wt. 80 lbs.

These generators are positively the last word in efficient design. Workmanship and appearance unsurpassed.

Prices are all F.O.B. San Francisco.

NEW WESTINGHOUSE SINGLE PHASE 110-VOLT INDUCTION MOTORS!

A Limited Quantity. These Prices
Cannot Be Equalled Anywhere.

1-20 H.P.	\$13.70.	Ship. wt.	
16 lbs.			\$18.30
1-8 H. P.	\$17.00.	Ship. wt.	
20 lbs.			22.70
1-6 H.P.	\$19.75.	Ship. wt.	
23 lbs.			24.15
1-4 H.P.	\$21.50.	Ship. wt.	
24 lbs.			25.20

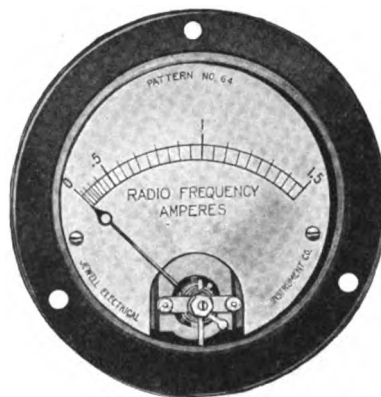
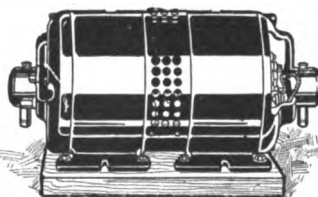
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San Francisco.

VACUUM TUBES

For receiving and transmitting
purposes. Complete stock.

Shipped Postpaid
Standard Prices

Heintz and
606 Mission Street



JEWELL ELECTRIC METERS

Pattern 33, 3 3/4" dia. Flush Type Milliammeters, D.C. for
plate current, 0-100, 0-200, 0-250, 0-300, 0-500 mill... \$6.50
Ammeters D.C. for filament current and battery charging.
0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5, 0-8, 0-10, 0-15, 0-20,
0-30 amps. \$6.50
Voltsmeters D.C. for trans- 0-150 volts 8.75
mission and reception. 0-3, 0-300 volts 9.75
0-7.5, 0-10, 0-15, 0-20, 0-25, 0-500 volts 14.50
0-30, 0-40, 0-50 volts. \$ 6.50 0-1000 volts 21.50
0-1500 volts 27.50

Pattern 25, same case as pattern 33 Thermo Couple, Radi-
ation meters, Radio Frequency Ammeters. 0-1, 0-1 1/2, 0-2,
0-2 1/2, 0-3, 0-5, 0-10 R. F. Amps. \$9.05

Pattern 54 3 3/4" dia. (new type) Flush Mtg. Milliammeters
D.C. for plate current. 0-100, 0-200, 0-250, 0-500 mill-
amps. \$8.40
Ammeters D.C. for filaments and battery charging. 0-1,
0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5, 0-8, 0-10, 0-15, 0-20, 0-30,
amps. \$8.40

Voltsmeters D.C. for trans- 0-150 volts 9.60
mission and reception. 0-3, 0-300 volts 12.25
0-7 1/2, 0-10, 0-15, 0-20, 0-30, 0-500 volts 16.75
0-40, 0-50, 0-75 \$8.40 0-1000 volts 23.75
0-1500 volts 29.80

Pattern 64, same case as pattern 54 Thermo Couple Radi-
ation meters. 0-1, 0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-4, 0-5 R. F.
Amps. \$12.40

Pattern 74 same case as patterns 54 and 64 Ammeters
A.C. For A.C. Power Supply and Filament Current. 0-1,
0-1 1/2, 0-2, 0-2 1/2, 0-3, 0-5, 0-10, 0-15, 0-20, 0-25, 0-30
Amps. \$8.30

Voltsmeters A.C. for A.C. 0-20, 0-30, 0-40, 0-50,
0-75 volts \$8.30
Power Supply and Fila- 0-150 volts 9.60
ment Voltage. 0-10, 0-15, 0-300 volts 12.25

The above prices are subject
to additional postage from San
Francisco.

All our meters are provided
with movements specially insu-
lated from the case—built to
our order at the factory of the
Jewell Instrument Co.

—All orders filled
from stock on any
standard equipment

Kohlmoos
San Francisco, Cal.

Say Radio to the Advertiser, it will help you.



An Ideal Christmas Gift

Every RADIO Enthusiast wants real apparatus. What, then, could be more welcome as an Xmas gift than a genuine

Federal Head Telephone

These popular head telephones were originally designed to meet the exacting requirements of army and navy specifications—professional equipment in every sense of the word.

Supersensitive, carefully matched in tone; every part made and inspected with extreme care.

No. 52-W 3200 ohm.....\$10.50
No. 53-W 2200 ohm..... 8.00

Write for Bulletin No. 103-WB

Federal Telephone & Telegraph Co.

Buffalo, N. Y.

HEARD BY 6AUN
6AK, 6AR, 6CV, 6CZ, 6DP, 6EA, 6EB, 6EN, 6ER, 6FT, 6GF, 6GI, 6GR, 6GP, 6GX, 6HH, 6HY, 6IC, 6ID, 6IS, 6JC, 6JE, 6JY, 6KA, 6KC, 6KR, 6KS, 6KY, 6MH, 6MK, 6MN, 6PJ, 6PO, 6QI, 6QR, 6SK, 6TI, 6TU, 6TV, 6VY, 6VR, 6ZB, 6ZN, 6ZX, 6ZZ, 6AAT, 6ABX, 6ACR, 6ACY, 6ADL, 6AEI, 6AFN, 6AGM, 6AIB, 6AID, 6AKL, 6ALE, 6ALU, 6ATX, 6ATQ, 6AVB, 6AWH, 6AWS, 6AWV, 6XAC, 6ZAD, 7BK, 7BP, 7ED, 7FI, 7IN, 7IU, 7JW, 7KB, 7KG, 7KJ, 7LU, 7MF, 7NL, 7TO, 7XD, 7XF, 7YA, 7YS, 7ZK, 7ZJ, 7ZM, 7ZT, 7ZU, 5ZA, 9BD (Canadian), 9HM, 9AMB (C.W.).

CALLS HEARD BY B. MOLMOSI 6AWT
5ZA, 6AK, 6AR, (6CV), 6IP, (6EA), (6EB), 6EN, 6ER, 6FH, 6FT, 6GI, (6GR), (6GR-C.W.), 6GF, 6GX, 6HH, 6HY, 6IC, 6ID, 6IF, (6IS), 6JE, 6JC, (6KA), 6KC, 6KR, 6KY, 6MH, 6MN, (6PO), 6QI, 6QR, 6SK, 6TI, 6TU, 6VY, 6VR, 6ZB, 6ZU, 6ZX, 6AAT-C.W., 6ABX, 6ABG-C.W., 6ADL, 6AEI, 6AFN, 6AGM, 6AIB, 6AID, 6AJH, 6AKL, (6ALE-C.W.), 6ALU, 6AVB, 6AWH, 6AWV-C.W., 6XAC-C.W., (6ZAD-C.W.), 7BK, 7BP, 7ED, 7FI, 7IN, 7IU, 7JW, 7KB, 7KG, 7KJ, 7LU, 7MF, 7NL, 7TO, 7XD, 7XF-C.W., 7YA, 7YS, 7ZK, 7ZJ, 7ZM, (7ZT), 7ZU, 9HM, (9BD-Canadian).
6DWT reported QSA on tube by 9BD Canadian.

Anyone hearing 6DWT please QSI B. Molinari, 653 Union Street, San Francisco.

PARTIAL LIST RECEIVED AT 6WI DURING SEPTEMBER
(Anybody Hearing 6WI Please QSL By Mail, Etc.)

5ZA, (6AAT), 6AAW, 6AK, 6ABM, (6AJH), 6ATQ, (6AVB), 6ADA, 6ABU, 6APE, 6ACA, 6ACR, 6AUL, (6ARnk), 6AFN, (6ACF), 6BW, 6CP, 6CV, 6DA, 6FK, 6CF, 6CR, 6IC, (6KC), 6OC, 6OH, (6PJ), 6SK, (6TV), (6VX), 6WZ, 6ZU, (6ZB), 7ZJ, 7ZM, 7ZT.

HEARD AT 6FB, REDONDO, CALIF.

Aug. 29-Oct. 23
5ZA (CW&SPK), 6AK, 6AS, 6CP, 6CV, 6DP, 6EX, 6FH, 6FK, 6GF, 6GR, 6IC, 6IM, 6KC, 6KM, 6OC, 6PJ, 6PR, 6QR, 6QT, 6TU, 6VK, 6WO, 6WG, 6ZB, 6ZU, 6ZX, 6ZZ, 6AAT, 6ABH, 6ABU, 6ABX, 6ACH, 6ACM, 6AFO, 6AGF, 6AJH, 6AMK, 6ARW, 6ATQ, 7BP, 7FI, 7IN, 7IW, 7KB, 7MF, 7MP, 7XD, 7YA, 7YG, 7YS, 7ZT, 7ZU, 9HT, 9IN, NK.
Log report can be given.

STATIONS HEARD AND WORKED AT 7BK, SEATTLE

September 15-October 15
Canadian 5CJ, Canadian special (9BD), 6AK, 6AAT, 6AAU, (6AAW), (6ABH), (6ABU), 6ABW, 6ABX, 6AEZ, 6AFM, 6AFN, 6AFO, 6AGF, (6ALE), 6ANG, 6APH, 6ARK, 6AVB, 6AWV, (6CH), 6CP, 6CV, 6DP, 6EA, 6EB, 6ER, 6EX, 6FH, 6GF, (6GR), 6GX, 6HY, 6IC, 6IM, 6IS, 6KP, 6LU, (6MH), NK, 6OC, (6OH), (6PJ), 6PO, 6QR, 6QT, 6SK, (6TU), (6VK), 6VM, (6VX), 6WZ, 6XAC, 6XG, (6ZU), 6ZX, 6QY, 6WZ, 6XAC, 6XG, (6ZU), 6ZX, 7BH, (7BP), 7CC, 7ED, (7FI), 7GA, 7HF, (7IN), 7IO, (7IW), 7JU, (7KJ), 7MF, (7NL), 7TA, (7TJ), 7XD, 7YA, (7YJ), (7ZM), 7ZT.

HEARD BY 5BR, VANCOUVER, B. C.
Sept. 1-Oct. 20, 1921

Canadian "5's" too numerous. 7ZT, 7KM, 7ZS, 7ZB, 7KB, 7ED, 7BP, 7BK, 7IN, 7MF, 6AH, 6EX, 6CH, 6GR, 6ZU, 6ALE, 6XAD-C.W., 6ABX, 6AFN, 6LU, 6AUA, 6IM, 6FH, 7ZJ, 7ZN, 7CC, 7XP, 7XD, 7ZM, 7LY, 7MF, 7MH, 7IW, 7FI, 7YJ, (7IC), 6QR, 6KA, 6KM, 6AWT-C.W., 6IM, 6AGF, 6WZ, 6VX, 6GR, 6FN, 6FH, 6AK, 6LU, 6GX, 6ANG, 6AEZ, 6ZX, 6IK, 7YJ, 7KM, 7BH, 7UJ, 7RA, 7BR, 7GA, 7CW, 7ZU, 7TJ, 7MP, 7LU. Loudest 6 station is 6QR in Reno, Nevada. Loudest 7 stations are 7BP, 7ED, 7ZT and 7ZU.

CALLS HEARD AT 7MF, EUGENE ORE.

Canadian 5BA, (5BR), (6AE), 6AK, (6AS), 6AE, 6AR, 6BJ, 6CL, 6CV, 6CY, 6DD, 6DP, 6EA, 6EB, 6EX, 6FH, 6FK, 6GF, 6GI, 6GR, 6IC, 6IM, 6IS, 6KA, 6KM, 6ER, 6MF, (6OC), 6OH, (6PJ), 6SK, 6TV, 6VK, 6VX, 6WZ, 6ZA, 6ZE, 6ZH, 6ZX, 7AC, (7AY), (7BK), (7BC), (7BJ), 7CN, 7YS, 7ZA, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZTACIN, 7ED, 7EX, 7FG, 7GO (C.W.), 7HW (C.W.), 7IN, 7IM, 7JW, 7KB, (7KJ), 7KM, 7LW, 7MO, (7MW), 7NL, (7NW), 7OT, 7SP, 7TO, 7XF (phone, music, C.W.), 7XD (CQ), 7YA, 7YS, 7ZA, 7ZJ, 7ZM, 7ZN, 7ZO, 7ZS, 7ZT, 5ZA (C.W.), 5IF, 6AAT (C.W.), 6ALE (C.W.), 6AQT, 6ARK, (6ABW), 6ARX, 6ABU, 6ABM, 6ABH, 6XAD (C.W.), 6XAC (C.W., phone), 6XG (C.W., music, phone).

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RECEIVING SETS

suitable for receiving ship amateur, or long wave signals.

SPARK TRANSMITTERS

complete with motor generators or gas engine driven generators.

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The surplus materials the Navy has available for sale have been grouped as shown below and catalogues describing these materials will be sent on your request.

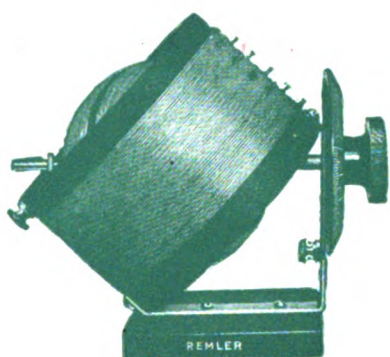
List of Surplus Materials

All Materials
Aeronautical Equipment,
Aluminum,
Bath Room Fittings and Plumbing Supplies,
Blankets,
Boats,
Books,
Brass,
Canvas and Tents,
Chemicals,
Cloth and Textiles,
Clothing,
Copper,
Electrical Equipment and Supplies,
Furniture,
Hardware,
Iron,
Lead,
Machinery,
Mess and Galley Equipment,
(Kitchen and Dining Room),
Monel,
Musical Instruments,
Navigating and Instruments of Precision,
Oils and Greases,
Paint and Paint Materials,
Provisions,
Radio Equipment,
Rope and Twine,
Stationery and Office Equipment,
Steel,
Tin,
Tools—Hand, Machine and Contractors,
Valves and Fittings,
Zinc.

CENTRAL SALES OFFICE
Navy Dept., Washington, D. C.

The Season's Greetings!

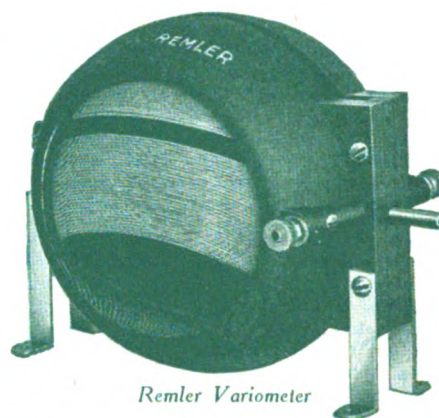
Xmas Presents and a *New Year* Resolution are in order. *A Radio Gift* is a lasting, pleasing and instructive one. Order Early. Make your *New Year* resolve to buy your Wireless Apparatus where you obtain:



Remler Vario-Coupler

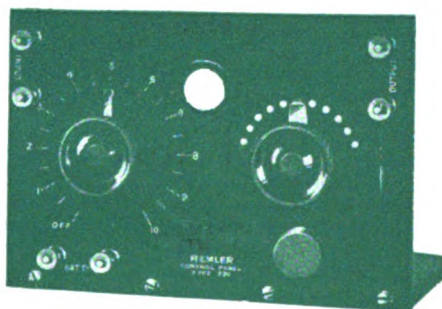
Type 503\$5.40
Type 504, with dial..... 6.40
Type 505, panel mtd...12.75

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Service that
gives you what
you want when
you want it,
and at a price
that is right.



Remler Variometer

Type 500\$6.00
Type 501, with dial..... 7.00
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Remler Detector Panel

Type No. 330. Price.....\$8.00

BURGESS B BATTERIES

No. 2156. Navy Type. 22½ volt with 18 volt tap
for G.E. tubes. Size 3"x4"x6½". Price.....\$3.00
No. 5156. Medium Type. 22½ volt, with 9, 13.5, 18
19.5, 21 and 22½ tap. Size 2¼"x2 9/16"x4 ¼".
Price\$2.75
No. 4156. Signal Corps Type BA-2. 22.5 volt. Size
2½"x2"x3 ¾"\$2.25

GREBE RECEIVERS

CR-3. 150-Meters\$65.00
CR-5. 150-3000 Meters, includes detector control.\$80.00
CR-8. 150-1000 meters, includes detector control.\$80.00
CR-9. 150-3000 meters, includes det. 2-step...\$130.00
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250W Fully Mounted Transform- er	\$17.60
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500W Fully Mounted Transform- er	24.20
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50W CW Fully Mounted Trans- former	16.50
200W CW Fully Mounted Trans- former	22.00
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75W Fil. Heating Transformer...	13.20
150W Fil. Heating Transformer...	17.60
150MA Single Choke Coll 1½H...	4.40
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500MA Double Choke Coll 1½H...	8.80
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Acme Semi Mtd. Amp. Transform- er	5.00
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C300 Cunningham Tubes	\$ 5.00
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UV202 Radiotron Tubes	8.00
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UV216 20 watt Kenetron	\$ 7.50
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EL1008 Oscillation Transformer..	11.00
UP415 Plate Circuit Kenetron	5.75
UP1719 Transmitter Grid Leak 5 watt	1.10

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UP414 Microphone Transformer ..	7.25
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No. 1 Mounted 0011	\$ 5.00
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No.3 Unmounted 0011	4.50
No. 4 Unmounted 0006	4.00
3/16 Bakelite Dial and Knob....	1.00
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21 Variable Grid Leak	3.00
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GENERAL RADIO

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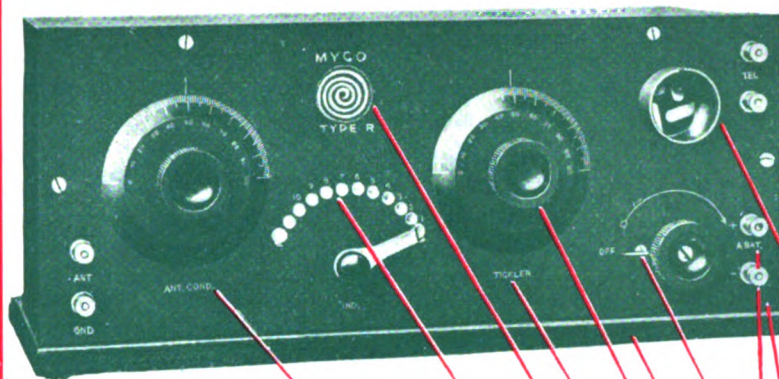
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- Vacuum Tube Socket: Metal Shell type with positive contact springs.
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- Metal Parts: Brass. Exposed parts satin nickel plate.
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- Inductances: Genuine bank wound with liberal size conductor giving maximum efficiency.
- Variable Condenser: Counter balanced type of ample proportions and trouble proof.

THE MYCO TYPE R RECEIVER is the ultimate result of design and experimentation to develop a receiver that is especially applicable to wavelengths between 150 and 3000 meters; both Spark and C. W., Telegraph and Telephony. It is so designed to tune in such stations in a minimum time and with wonderful ease and positiveness. The Myco Universal Receiver has been designed and built after exhaustive experimentation to meet these requirements and does so to perfection. All unnecessary controls have been eliminated so that the only changes necessary to vary wavelengths are one Variable Condenser and the inductance Switch. Such adjustments are not critical but after the desired station has been heard they can be amplified very greatly by increasing the tickler control. This arrangement means that practically any station within range can be picked up and tuned in to maximum amplitude in a few seconds of time.

This receiver is offered in one model only employing some original ideas in construction. Combined with the receiver in the same cabinet is an efficient vacuum tube control resulting in a set complete ready to connect on to batteries and aerial and ground.

Entire assembly complete on panel which permits of easy removal for inspection of interior. Each receiver shipped in heavy wooden case guaranteed against damage and full instructions inclosed.

For those who desire a greater amplitude of signals than is obtainable with our Universal Receiver alone, we offer a two-stage amplifier unit to be used in conjunction with same.

The unit is exactly the same height and depth as Myco Universal and is intended to set along side. The connection lugs are furnished with the amplifier.

Myco Two-Stage Amplifier f. o. b. San Francisco, \$55.00

See your dealer who has information on this set or write for Bulletin 1000A giving detailed instructions of the Myco Type R Receiver and Amplifier.

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—and it was some job

Yes—We are now located in that new factory which we told you about last month. And O Boy, it's some nice place. All the light and air we need and lots of space to put things.

Now—We can soon begin to take care of the ever increasing demand for "Wireless Shop Variable Condensers"; the Quality instrument that is made right and stays right. We are not quite settled completely, but we are now running and will be up to full production within a week.

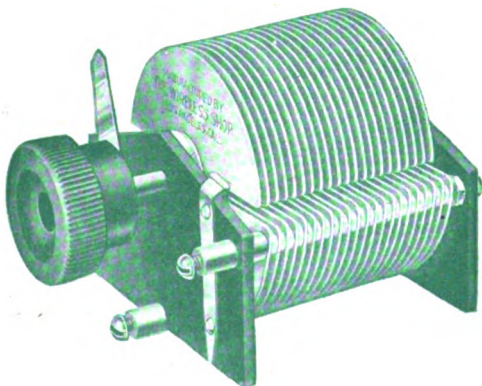
But Remember—We have a lot of orders ahead, and if you want prompt deliveries we cannot urge you too much to place your order at once. We will try hard to keep our shop producing enough condensers to take care of the orders, but the way orders are arriving every day now, it looks as if we would be swamped.

There Must Be a Reason Why "Wireless Shop" Condensers Are So Much in Demand. We know the reason, but perhaps no one has ever let you in on the secret. "Quality"—that's the reason. If you have ever seen one you know, but for those fellows who have never had the opportunity of looking them over, we'll tell you that it's *Quality* that sells "Wireless Shop Condensers." With the fellow who knows, the *Best* is what he wants. If you happen to be one of those who don't know, write us for a copy of Bulletin No. 1, which describes and illustrates the complete line of "Wireless Shop Condensers."

They are made in three types and fourteen sizes—one for every need.

SERIES "T"

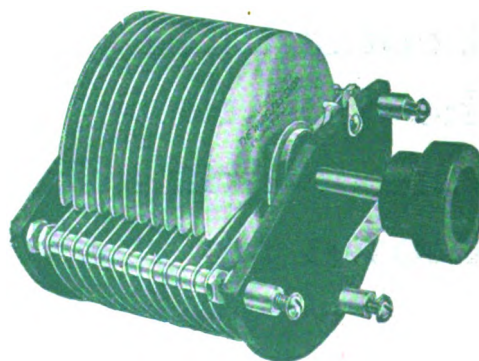
Three-inch stationary plate. For receiving circuits. Easy to mount back of your panel. Fitted with knob and pointer.



No. 20 2-plate Vernier Condenser.....	\$2.00
No. 70 7-plate, approximately .0001 m. f. maximum capacity	2.35
No. 130 13-plate, approximately .0002 m. f. maximum capacity	2.75
No. 170 17-plate, approximately .0003 m. f. maximum capacity	3.15
No. 230 23-plate, approximately .0005 m. f. maximum capacity	3.60
No. 310 31-plate, approximately .0007 m. f. maximum capacity	4.30
No. 430 43-plate, approximately .001 m. f. maximum capacity	5.25
No. 630 63-plate, approximately .0015 m. f. maximum capacity	7.50
Include postage for one pound to your postal zone, and insurance.	

SERIES "CW"

Four inch stationary plate. Wide spacing for "CW" work. Fitted with knob and pointer. Solid Formica End supporting plates.



No. 1500 15-plate, approximately .0004 m. f. maximum capacity	\$6.00
No. 2500 25-plate, approximately .0006 m. f. maximum capacity	7.50
No. 3500 35-plate, approximately .0008 m. f. maximum capacity	9.00

Include postage for two pounds on No. 1500 condenser, and for three pounds on No. 2500 and 3500, and insurance, to your postal zone.

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Los Angeles, Cal.

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CALLS HEARD BY 7GO, SALEM, ORE.
Sept. 10-Oct. 5—(One Stage)

6AS, 6ABH, 6ABM, 6ABW, 6ACR, 6AEW, 6AEZ, 6AFN, 6AGF, 6AID, 6ALE(C.W.), 6AJH, 6ATQ, 6AWH, 6AWT(C.W.), 6BAF, 6CP, 6EA, 6EX, 6GI, 6GF, 6GR, 6IC, 6ICN, 6IS, 6KA, 6OC, 6TU, 6TV, 6VX, 6WJ, 6WZ, 6XG(C.W.), 6ZAD(C.W.), 6ZB, 6ZM, 6ZR, 6ZU, 6CE, 6BK, 6BP, 6ED, 6FI, 6GA, 6IM, 6IU, 6IY, 6KB, 6KM, 6KJ, 6KW, 6LY, 6MO, 6MW, 6NL, 6TZ, 6XD, 6XF(C.W.), 6YJ, 6ZJ, 6ZM, 6ZS, 6ZT, 6HM, 6AX (Canadian 9AX?)

CALLS HEARD BY 6WR, PASADENA, CALIF.

July 30-Sept. 15

All work was done with a single audiotron tube and variometers.

(6AE), 6AK, 6AR, and "NK," 6CV, 6EP, 6FK, 6GF, 6HC, 6IC, "JS," 6KC, 6KX, 6MK, 6MY, 6OC, 6OH, 6PJ, 6TU, 6TV, 6VK, 6VX, 6WZ, 6ZB, 6ABM, 6ABU, 6ABW(C.W.), 6ABX, 6AEZ, 6AFB, 6AGB, 6AGF, 6AID, 6AJH, 6AKL, 6ALE(C.W.), 6ANG, 6APE, 6ARW, 6ATW, 6AND, 6AUV, 6AWH, 6AWI, 6BAW(C.W.), 6ZT, 6BP.

HEARD AT 6AAK, SANTA BARBARA, CALIF.

CL-fone, 6AH, 6LC, 6ZX, 6AK, 6MH, 6AAT-C.W., 6BW, 6MZ, 6ABW, 6CR, 6OH, 6ABX, 6CV, 6PJ, 6ACR, 6EX, 6SK, 6AGF, 6FK, 6TV, 6AJH, 6GF, 6TU, 6APE, 6GR, 6VK, 6ATV, 6KA, 6VX, 6KC, 6WZ, 6KS, 6ZB, 6LB, 6ZU.

HEARD AT U. S. FOREST PATROL STATION S.B., SANTA BARBARA, CALIF.

BY 6AAK

6AH, 6AK, 6BW, 6CR, 6GF, 6KC, 6KS, 6PJ, 6SK, 6TU, 6TV, 6VX, 6ZU, 6ABW, 6AGF, 6AHJ, 6APE, 6DLU, (...N78) 6AH, 6AK, 6BW, 6CR.

CALLS HEARD BY RADIO 7QR, C. V. ANNIN, MYRTLE POINT, ORE.

Sept. 27-Oct. 28

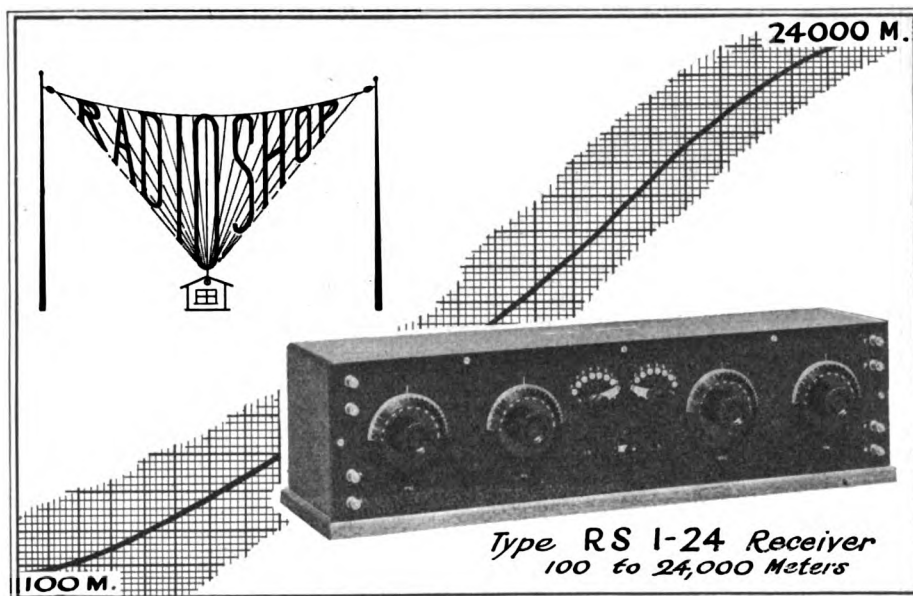
On Crystal detector and 3500-meter loose coupler: 6AK, 6BB, 6CV, 6GF, 6GR, 6HY, 6IC, 6IM, 6KA, 6KM, 6PJ, 6QR, 6VX, 6WZ, 6ZU, 6ZX, 6AAU, 6ABX, 6AFN, 6AGF, 6AID, 6APE, 6AVY, 6BH, 6BK, 6BP, 6ED, 6FI, 6GA, 6IN, 6IW, 6IY, 6KJ, 6MF, 6MU, 6MY, 6RF, 6VX, 6YJ, 6ZM, 6ZS, 6ZT, 6AX, 6BD.

HEARD AT WJK, TAFT, CALIF.

5ZA, 6AH, 6AJ, 6AN, 6AAX, 6AAW, 6ADI, 6ADI, 6ANE, 6AMX, 6AJT, 6AEI, 6ARO, 6AIV, 6ARW, 6ATF, 6ATQ, 6BW, 6CP, 6DA, 6EX, 6FX, 6FY, 6GF, 6GT, 6IF, 6II, 6IV, 6KC, 6KX, 6LY, 6MK, 6PJ, 6SK, 6TU, 6TV, 6VK, 6VM, 6VX, 6XAC, 6XAD, 6ZB, 6ZTD, 6ZU, 6XD, 6YG, 6YA, 6LY, 6ZT, 6ZU, 6ZAF, 6ZA calling 9ZN and 9PS (9:08 p. m., Oct. 10th).

It might be of interest to know that the Bakersfield Californian is operating two five-watt radiophone sets, one at Bakersfield and the other at Taft. We are getting one and a half amperes radiation on 400 meters. Our signals are reported as heard by 7YA at Boise, Idaho, and the West Carmargan, a freighter, while 100 miles out of Honolulu. We have been sending out the baseball reports of the world series play by play as received from the AP and would appreciate a card from anyone having heard these signals.

PHILLIPS THYGESON, Old 6BU.
Op. at WSK.



The Radio Shop

type "RS 1-24" Receiver

THE demand for this receiver has exceeded our expectations. Advertising was withheld in order to allow us to fill the orders. Insure delivery of your Xmas set by ordering now.

AN original application of regenerative tuning to a receiver that covers, with the utmost efficiency, every wavelength in use today.

Write for circular.

Panels Engraved

Let us engrave your panels on our new Gorton Engraving Machine
WRITE for PRICES ON THIS WORK

THE RADIO SHOP

SAN JOSE, CALIFORNIA

Beacon



Radio & Electric Co.

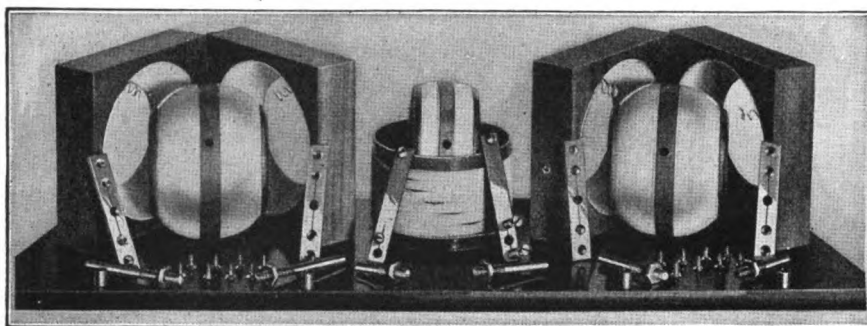
McNISH AND OWEN

ANNOUNCES

the opening of their new store at 246 Greenwich St., near Park Place, New York City.

This store will be under the management of B. K. Owen, formerly of 235 Fulton St., New York City.

FAMOUS "CHI-RAD" K. D. VARIOMETER PARTS



All parts to build two variometers and one coupler. ALL WINDINGS IN PLACE—nothing to do but screw on bearings and connect up. Complete set can be assembled in 30 minutes. The biggest value on the market—order a set today. Immediate Delivery.

Price, complete as shown, \$10.00. Add PP on 6 lbs.

SPECIFICATIONS

Variometer forms 4 1/4 in. Sq., 3 in. wide when assembled. Coupler primary Bakelite 3 1/2 in. diam., 3 1/4 in. high. All shafts 1/4 in. diameter. 7 Primary Taps.

Range 150-475 meters. Special condenser to shunt secondary and increase range to 650 meters supplied for 35c extra.

Made specially for panel mounting—all screws covered by dials when assembled.

Immediate Delivery—Money Back Guarantee.

CAUTION

Due to the great popularity of "Chi-Rad" Variometer Parts they are being imitated. For your protection our name appears on every instrument. Accept no substitutes—insist on "Chi-Rad." Solid Mahogany Variometer Parts. Your dealer will get them for you.

Dealers: Write for discounts on these Variometer parts. They will move fast and make you a handsome profit. We

are also jobbing all standard lines of Radio Apparatus. Why not buy all your Radio material from one, old reliable house and get full dealer's discount, plus "Immediate Delivery" from Chicago stock? Write for full information.

Chicago Amateurs: Come and inspect our new stock—largest and most complete in the Middle West.

CHICAGO RADIO APPARATUS CO., Inc.

Phone: Harrison 1716

508 South Dearborn Street

CHICAGO, ILL.

CODFISH FOR CHRISTMAS

(Continued from Page 203)

subscriber to a popular wireless magazine, whose full-page ads of magnificent apparatus quickly brought him to an unhappy realization of the comparative poorness of his own equipment. With a most childish eagerness he would study for hours the beautiful illustrations of imposing long-wave receivers, alluring two-step amplifiers, and all the other splendid apparatus. He swamped himself with a multitude of catalogs and earnestly longed to buy everything in all of them; all the while realizing that he could not afford to buy anything in any of them. It taxed his resources to buy enough coal to keep from freezing to death through the long Alaskan winter with its fierce snow-storms and shrieking northwest blizzards.

So Old Judge had studied the handsome array of apparatus in his catalogs with a sort of despairing worship, until one day Samuel Jones had a falling-out with a certain Siwash belle of Unga, and immediately developing an acute attack of the wanderlust, announced that he was going to pull out for San Francisco. Then it was that there had dawned upon Old Judge's horizon the dazzling possibility of his getting the berth at K-V-I with its free coal and provisions and a

(Continued on Page 224)

< STANRAD >

GEN Works 1000 Miles on 10 Watts CW

You Can, Too!

With Apparatus Designed for

RESULTS EFFICIENCY SERVICE



The "STANRAD" Inductance is built for RESULTS—that's what you want—RESULTS!

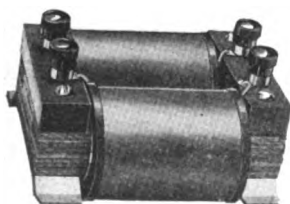
It has 54 turns of copper wire wound on a 4-inch threaded formica tube. The wire cannot slip or come loose.

The margin at each end makes it easy to mount by means of brackets, mounting posts, etc.

One or two-coil winding. \$5.00
Threaded tube only..... 3.75
Inductance for 100 watts. 10.00

The choke coils are wound on fiber spools. This eliminates break-downs. Binding posts are provided for connections, and aluminum feet to simplify the mounting. The inductance, approximately 3 henrys, is enough to clear the worst hum.

500 M. A. \$7.50
150 M. A. 6.00



If your dealer cannot supply you, write direct.

STANDARD RADIO COMPANY

1048 So. Olive St., Los Angeles, California



Things that never happened here
Are really heard in Lap-
land clear.

Say Radio to the Advertiser, it will help you.

Acme

C.W. APPARATUS

ONE OUT OF A THOUSAND COME BACK

During all the time Acme has built C. W. apparatus, less than one instrument out of every thousand has come back for replacement, or even repairs.

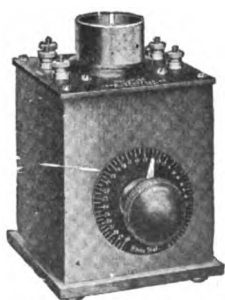
Take the uncertainty out of C. W. by using Acme apparatus thruout.

Acme was the first to prepare for C. W. Years ago we began to develop an Acme instrument to anticipate every C. W. need. Today Acme has the most complete line of C. W. apparatus in existence. Each in-

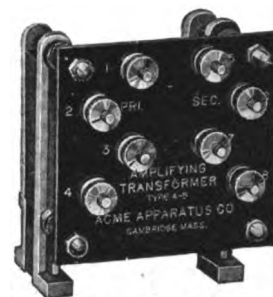
strument is the fruit of exhaustive research and all are designed with careful reference to the others. Before you start your C. W. outfit, get the Acme bulletins. And when you do build, use Acme apparatus thruout!

ACME APPARATUS COMPANY

182 MASSACHUSETTS AVENUE
CAMBRIDGE, 39, MASS.



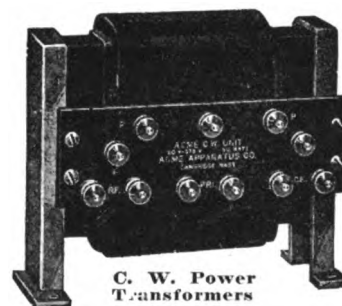
And don't forget the little Acme detector and amplifier unit. Compact, efficient, guaranteed, reasonably priced. At all dealers.



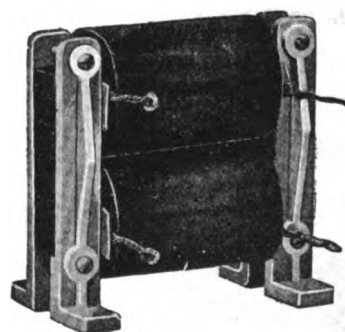
Modulation Transformer



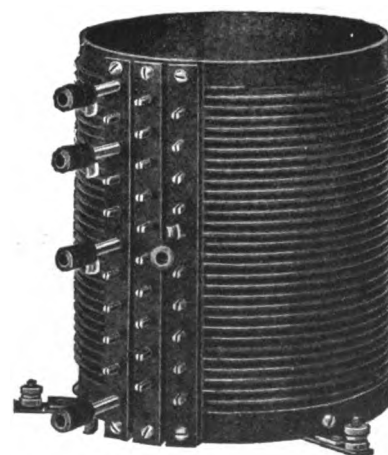
Filament Heating Transformer



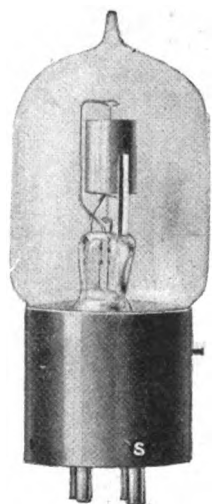
C. W. Power Transformers



1 1/2 Henry Choke Coil



C. W. Inductance



Everything for the Radio Man!

Our Stock of Radio Equipment is Complete. Everything from the Aerial to the Ground.

*Vacuum Tubes of All Makes
Supplies and Accessories*

Get
Your
Xmas
Radio
Goods
Here

Electric Supply & Repair Co.
520 Market Street, San Francisco

"Elements of Radiotelegraphy"

By LIEUT. E. W. STONE

A 400 Page Book that contains much valuable information on many Radio Systems. Price \$2.50 Per Copy, Postpaid.

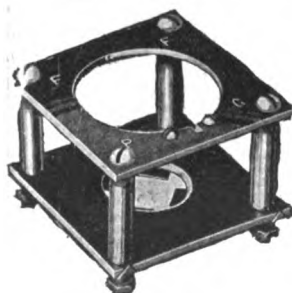
"RADIO," 465 Pacific Bldg., San Francisco, Calif.

SOMETHING NEW

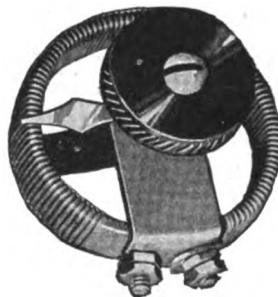
Made to Please You and Priced to Please Your Pocketbook

By departing from conventional design in audion sockets we have combined the advantages of all, the disadvantages of none and a price lower than any. Think of it—a sturdy, easily mounted socket that is heat proof, has bakelite-diellecto insulation, handy binding posts, etc., all for 75c.

And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.



Type 126, Tube Socket
Price 75c Postpaid



Type 122 Rheostat
Price 90c Postpaid

THE WILCOX LABORATORIES
LANSING, DEPT. J., MICHIGAN

CODFISH FOR CHRISTMAS

(Continued from Page 222)

salary of a hundred and fifty dollars a month.

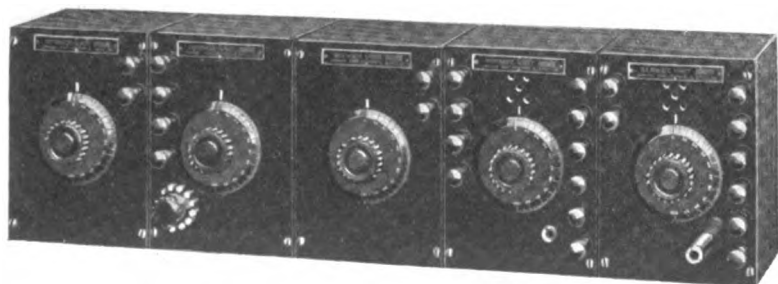
Losing his head in a whirl of joyful excitement at the mere prospect, Old Judge dispatched an order to a wireless supply house for over three hundred dollars worth of apparatus. He felt that even if he became operator over at K-V-I he would still want his amateur set for amusement and for conversing with the passing ships. He sent a small draft with his order and trusted to a belief that he would be able to draw from the codfish company an advance salary check to meet the C. O. D. bill of more than two hundred and fifty dollars when the apparatus arrived.

AND now, in one short afternoon, his hopes had been wrecked, his dreams shattered. Sadly, Old Judge regarded the newly-arrived packages. They would have to go back now. There was no doubt about that. Well, at any rate, being postmaster gave him the opportunity to unwrap the instruments and look at them, at least, before sending them back.

Without much enthusiasm, Old Judge untied one of the heavy packages, carefully removed the wrappings and brought to view a big, powerful-looking six-inch spark-coil. It was clearly a splendid instrument. Its polished mahogany case shimmered richly and its finely built vibrator with large, accurate contacts bespoke its quality. Old Judge set it on his instrument table and ruefully compared his own little coil, so small and inferior-looking beside the glistening big beauty. What distances he could do with the boys on the ships with this coil! Sixty miles any time, perhaps a hundred. And he had to send it back.

Fumblingly, Old Judge opened the next package. It contained a magnificent regenerative receiver. It was a superior instrument, its flawless panel, perfectly-grained, setting off artistically the glossy black dials, beautifully engraved, turning true and with a velvety smoothness.

Service Radio Equipment



Service Unit Receiver

SERVICE equipment fills the needs of every Amateur. Built into each instrument is the care and precision that will insure perfect operation and long life. And to back this statement is a guarantee that absolutely protects the purchaser.

Send for our bulletins now and let your next order be for SERVICE EQUIPMENT. Register on our mailing list and keep informed of the latest in radio development.

We have three ideals—

The first is SERVICE—so are the other TWO

SERVICE RADIO EQUIPMENT

Box 340 Central Sta.

Toledo, Ohio

Say Radio to the Advertiser, it will help you.

But splendid piece of apparatus as was the regenerative receiver, it was outdone by a long-wave tuner with a complete set of honeycomb coils, and by a two-step amplifier that fairly took Old Judge's cabinet work, lustrous black insulation, and heavy rich nickel—a superb instrument.

For a long while Old Judge sat entranced, inhaling the faint odor of fresh insulation and metal that emanated from the tableful of handsome apparatus. How tarnished and dilapidated his own little set looked beside this magnificent equipment.

A passionate desire to keep all these beautiful instruments swept over Old Judge. What stations might he bring in; countless ships, land stations near and far, perhaps sometimes an amateur from the distant outside, certainly dozens of high-power arcs from everywhere. Old Judge had always wanted to tune in the arcs. He had often listened to them over at K-V-I, and had longed for a set that would bring them in.

A damp, chilly draft brought Old Judge back to earth. The fire was out and the room cold and cheerless. Taking his coal-hod, he went out into his little kitchen and scraped up a few scant shovel-fuls of siftings from the bottom of his empty coal box. It took six tons of coal to see Old Judge through a winter—and coal cost forty-five dollars a ton down at the codfish company's shed. Besides, there were still costlier provisions to be bought.

Heavy at heart, Old Judge carefully rewrapped all the instruments and took them back into the room which he used as a postoffice. The mail boat was now at Dutch Harbor, to the westward, and upon her return the apparatus would go back with her.

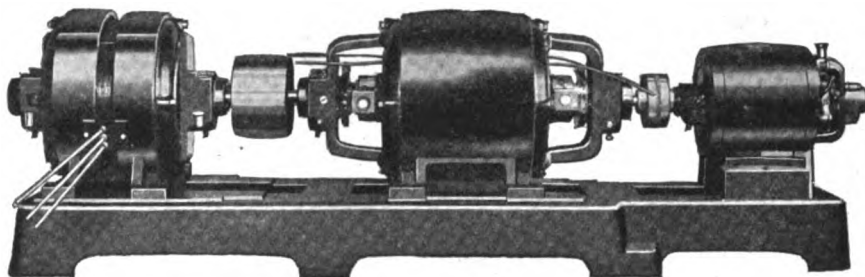
Glancing at his calendar, Old Judge noticed with a shock that the mail boat was scheduled to touch at Unga, east-bound, on Christmas Day. It looked as if it was going to be a cheerless sort of Christmas for Old Judge.

Every year the codfish company sent up a few crates of live turkeys from San Francisco on the winter supply-schooner; and despite their sky-high prices, Old Judge had always managed to have one—but he was not going to have one this year. The postoffice wasn't bringing in much of late; weddings seemed to have gone out of style, shutting off that source of revenue; and the sourdoughs' guns were rusting from lack of use, with the result that even the eight-dollar court fee seldom came any more.

No, clearly, Old Judge would have no turkey this year. The company generously gave free codfish from the tanks to anybody who wanted it; and Old Judge would have to get along with fish. Codfish for Christmas wasn't a very

(Continued on Next Page)

TRADE **ESCO** MARK
GENERATORS—MOTOR-GENERATORS—DYNAMOTORS



4 to 32 Volts for Filament—350 to 2000 Volts for Plate.
Capacity 20 to 2000 Watts—Liberal Ratings.
Write for Bulletin 237, which lists over 200 Combinations.

**MOTORS AND GENERATORS DEVELOPED
FOR SPECIAL PURPOSES**
PIONEERS IN MANUFACTURING

High Voltage Direct Current Radio Generators

Electric Specialty Co.

STAMFORD, CONN., U. S. A.

217 South Street



Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser,
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

Northwest Radio Service Co.

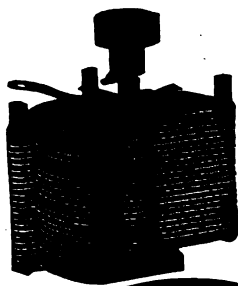
609 Fourth Avenue

SEATTLE

WASHINGTON

"ILLINOIS" THE RELIABLE

MADE RIGHT - STAYS RIGHT



STYLE No. 1.

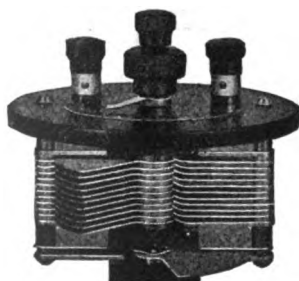


STYLE No. 2.

Three Styles; No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profiteer. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by insured Parcel Post.



VERNIER

Options:—With Style No. 1—Instead of Scale and Pointer, a 3. inch Metal Dial at 50 cents extra, or a 3. inch Bakelite Dial at \$1.00 extra. Large Knobs. Both excellent values. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial. Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

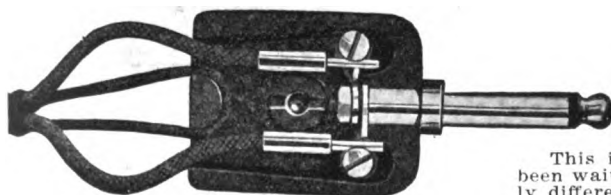
Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone add 10c. Canada, add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave.

Springfield, Illinois



HERE IT IS—

This is the plug you have been waiting for. It is entirely different from anything on the market.

FEDERAL

Universal Plugs

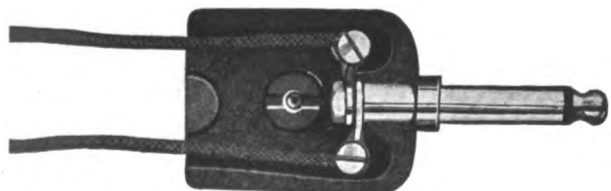
made of Bakelite and designed to take any type of conductor without soldering; are attractive in appearance; simple in construction.

For plugging in head telephone sets, power supply, microphone transmitters, transmitting keys, or as many other things that an ingenious radio operator may think of.

A decided improvement over the ordinary telephone switchboard plug.

PRICE \$1.75

Dealers write for special proposition.



FEDERAL

TELEPHONE & TELEGRAPH COMPANY

BUFFALO, N. Y.

CODFISH FOR CHRISTMAS

(Continued from Preceding Page)

cheerful sort of prospect, but Old Judge felt that he could face it with a smile if only he could keep those magnificent instruments.

Had Samuel Jones known all of these things, he would undoubtedly have put Old Judge in at K-V-I. Old Judge realized this, but old and needy as he was, he had some pride. If he wasn't good enough for the job, he didn't want it given to him as charity.

Three weeks later, a wintry blizzard came shrieking over the Shumigans. Towering green seas boomed and thundered on the ocean-exposed shores of Unga Island, and the bitter northwest wind, sweeping down the sides of the white-clad island mountains, brought swiftly-flying gusts of hard, frozen flakes and crashing cannonades of sleet, until all the world seemed turned to snow and ice.

Provisions and coal were exhausted at the company store and the uneasy village was anxiously awaiting the arrival of the schooner "Anangashak," bringing a full cargo of fuel and food supplies, and the annual shipment of Christmas goods. Since the schooner carried no wireless, the time of her arrival was a matter of conjecture.

For five days the blizzard held on, steadily increasing in fury. Samuel Jones paced restlessly back and forth in his receiving room, or stood before his bay window and gazed out over the storm-swept sea toward the opposite island of Nagai, ten miles distant, whose lofty white peaks were occasionally visible during brief lulls in the blanketing snow-squalls.

Darkness fell. The roaring blizzard shrieked fiercely around the eaves of the wireless house; and the rocky ledge upon which the building stood quivered jarringly under the thundering impact of the towering rollers that hurled themselves against its granite base and enveloped the ice-crusting cliffs with white sheets of flying spray and sea-water which came swishing momentarily on the window-panes of the receiving room.

Standing in the darkness, gazing out into the night, the lone operator suddenly saw a far-distant fiery red serpent shoot skyward and burst into a shower of tiny glowing stars. Again and again a sinuous tongue of flame flashed like a little electric spark before a background of black velvet, until the watcher realized that distress rockets were being fired from over on Nagai Island.

Next morning the storm lulled, giving way to silently falling snowflakes that grew into great drifts around the buildings and sheds and made somber white ghosts of the mountains that girded the harbor round. Taking advantage of the pause in the storm, a power-boat ven-

(Continued on Page 228)

For Christmas---a MAGNAVOX with the big new 14" horn

Get a MAGNAVOX now for Christmas, the one reproducer that will give you all the volume you want, without any distortion and without injuring your apparatus. Specify Type R-3 MAGNAVOX and get the big, new 14" horn without any additional cost—price complete \$45.

Throw away the uncomfortable head set that chains you to your outfit. Get a MAGNAVOX. Delight your friends with radio concerts and wireless dance music. Make your set the source of pride and center of enjoyment it should be.

And be sure it's a MAGNAVOX, the **only** reproducer with the **movable coil**. Look for the trademark on the horn. If your dealer cannot supply you, write us direct. Do not accept a substitute.

PRESENT MAGNAVOX OWNERS may purchase the new horn alone for \$15, but no exchanges will be accepted.



Dealers—Write for Proposition.

Write for FREE Folder

—Illustrating and describing the construction and operation of the Radio MAGNAVOX, and the famous movable coil, also the new MAGNAVOX Two-step Amplifier especially designed for use in connection with the distortionless reproduction of wireless music. Other MAGNAVOX apparatus also described and illustrated. This folder FREE. Write for it to-day.

General Offices and Factory
OAKLAND, CALIFORNIA
New York Office

370 Seventh Avenue Pen. Terminal Bldg.



The reproducer with the movable coil

THE RADIO MAGNAVOX

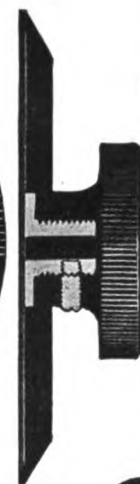
—the reproducer with the movable coil (Patented), the one instrument that will faithfully reproduce sounds and signals in any volume desired, without distortion and without injury to the apparatus. No set complete without one. Anyone can operate it. Full instructions free with each outfit. Type R-2 with 22" horn, price \$110.

Type R-3 with new 14" horn, Price \$45.

At your dealer or direct from factory.



3-Inch Dial and Knob



V. T. Socket

All instruments are made of Bakelite

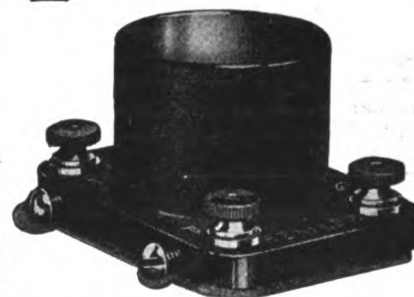


Filament Rheostat, Knob and Pointer

Free for 30 Days



Polished Bakelite Knob 1 3/8 in. diameter, threaded for 8-32 screw. Five of these beautiful knobs given free with one subscription to RADIO. Inclose 12 cents for mailing charges.



Take your pick of any instrument illustrated—send us your subscription for one year and the premium is yours—absolutely **FREE!!!**

RADIO 465 Pacific Bldg.
San Francisco, Calif.

This coupon must reach us no later than Dec. 25th

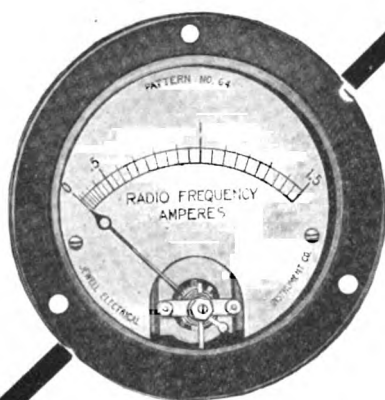
Herewith is \$2.00 for which you will send me "RADIO" for one year. I also enclose 12c for mailing the premium.

Name

Address

Premium Desired

Say Radio to the Advertiser, it will help you.



Use Thermo- Couple Instruments for C. W.

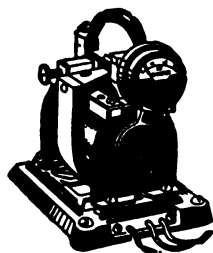
☐ All long distance C. W. operators use thermo-couple ammeters. ☐ Precise electrical measurements are the basis for the successful operation of any C. W. set. ☐ Unreliable and inaccurate instruments will result in the unreliable operation of any set. ☐ Government Bureau of Standards tests have shown Jewell thermo-couple instruments to be accurate and reliable.

Price \$12.00

Get Our New Radio Instrument Circular From Your Dealer

JEWELL ELECTRICAL INSTRUMENT CO.
CHICAGO

10c Charges Your Battery AT HOME WITH AN F-F Battery Booster



and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament Storage Battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? The F-F Battery Booster is a Charging Apparatus, unflinching in its ability to deliver service day and night; is rugged, foolproof and requires no skill to operate; charging automatically and operates unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. **Ammeter** shows amount of current flowing. Everything Complete in One Compact, Self-Contained, Portable Unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Current. New Models at PRE-WAR Prices.

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes.....	\$15
Bantam Type 12 charges 12 Volt Battery, at 5 Amperes.....	15
Type 166 charges 6 Volt Battery, at 12 Amperes.....	24
Type 1612 charges 12 Volt Battery, at 7 Amperes.....	24
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes.....	36

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights, complete with **Ammeter** and **Battery Clips**, 12 to 15 lbs. Order from your Dealer, or send check for Prompt Express shipment. If via Parcel Post, have remittance include Postage and insurance charges, or have us ship C. O. D.

Order Now, or Write Immediately for Free Descriptive Booster Bulletin No. 33.

THE FRANCE MFG. CO.

General Offices and Works: Cleveland Ohio, U. S. A.

Canadian Representative: Battery Service and Sales Company, Hamilton, Ontario, Canada

Phone Kearny 2778

PACIFIC RADIO SCHOOL

ARC & SPARK SYSTEMS

Hours:

1 to 5 P. M.

7 to 9 P. M.

433 Call Bldg.,

San Francisco, Cal.

Send for descriptive circular.

CODFISH FOR CHRISTMAS

(Continued from Page 226)

tured over to Nagai—and returned bringing the crew of the schooner "Anangashak."

Lost in the blizzard, the vessel had struck on Nagai. The crew got ashore, but the ship and all her cargo was a total loss.

Seeking out the skipper of the "Anangashak," Samuel Jones inquired for his relief operator.

"Him wouldn't come," replied the brawny shipmaster. "Seems like him didn't know were ve vas going ven he comed aboard, but yust ven ve vas pulling out, somebody telled him an' he skiddled ashore without efen his dunnage. Ay fancy him neffer vent back to der offis, an' them bane tankin' him vas aboard."

The news of the shipwreck spread quickly through the village. Soon a knot of anxious fishermen, all with numerous healthy kiddies to be fed, were gathered in the company store. The superintendent joined them.

"We'll have to get relief from Dutch Harbor or we'll be up against it," he said. "We divided the last sack of flour in the store yesterday. There's no fish on the grounds in this weather, and what little we had in the tanks has already been cleaned out. I went to get Old Judge a piece this morning, but there wasn't a fin left."

SHORTLY afterward, Samuel Jones emerged from the company store with a message for the Alaskan revenue cutter service at Dutch Harbor, explaining the plight of the village and asking for a relief cutter with supplies.

Staggering through the storm, which was again sweeping over the island with renewed fury, Samuel Jones was overtaken by Johnny Topsy, a rosy-cheeked youngster with a passion for wheels and machinery. With his ingenious, merry smile, Johnny had established a right of unquestioned admittance to K-V-I, where he spent much of his time keeping the station's engine looking as if it had just arrived from the factory.

"Stormy Gus come over from Pirate Cove while it wasn't blowin' so hard this mornin'," announced Johnny, as he followed Samuel Jones into the station and began shaking the snow off himself. "He says both 'a Hell-Fire's wireless masts bin blowed off into th' ocean, an' a freeze-up's busted th' cylinder of his diesel-engine. He's all on th' bum, ain't he?"

Samuel Jones did not reply. He was disappointed and angry over that chicken-hearted relief operator who had crawled and left him facing the prospect of being stuck at Unga indefinitely.

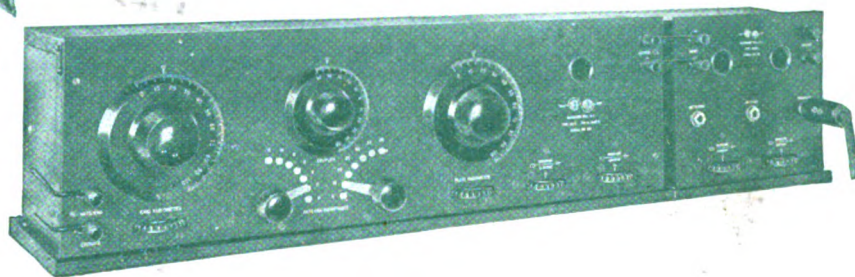
If only Old Judge wasn't such a hopelessly rotten operator—but as Samuel

(Continued on Page 234)



A man without thought for the future—must soon have present sorrow—
Think of the coming clear cold nights
and buy that **Grebe Receiver**
Now!

Doctor Thru



DEALERS who realize the value of highly satisfied customers recommend and sell Grebe Radio Apparatus. These dealers know good apparatus. They know also that the Grebe slogan:—"Each instrument manufactured by us must give satisfactory service"—means exactly what it says.

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" 400	1.80	.90	
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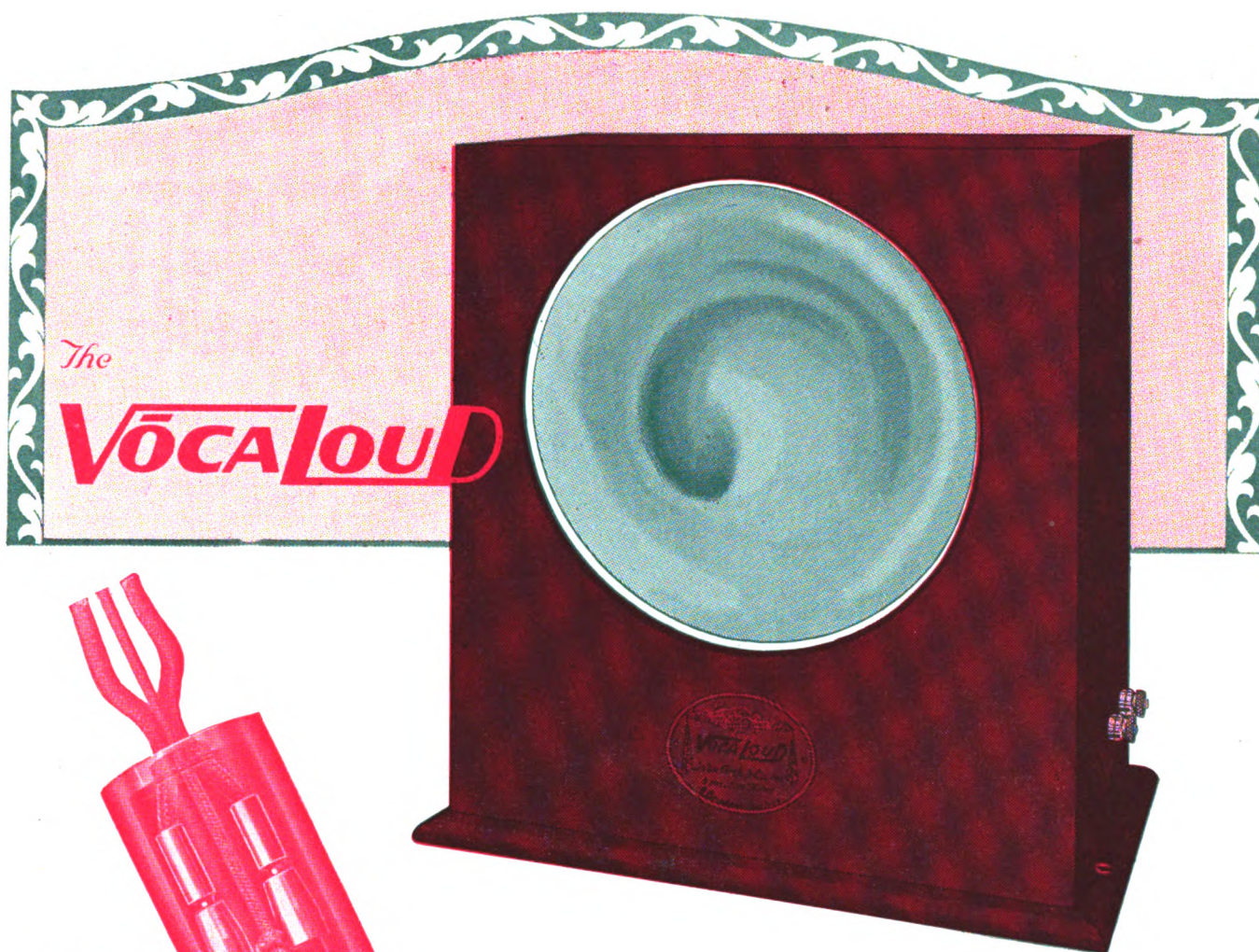
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The Ideal Christmas Gift

Put a Vocaloud at the top of your Christmas list. Then when Christmas morning comes, just hook it right on to your receiving apparatus and get your signals QSA all over your house. No batteries, no adjustments, no extras whatever! Just hook on your Vocaloud and listen!

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Mr. Linden is in charge of the San Francisco store and extends a cordial welcome to radio men of the city and Bay Districts to inspect the new sales rooms.

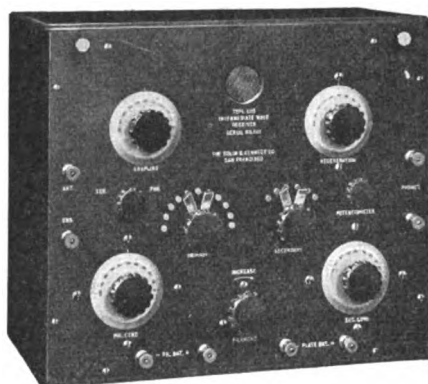
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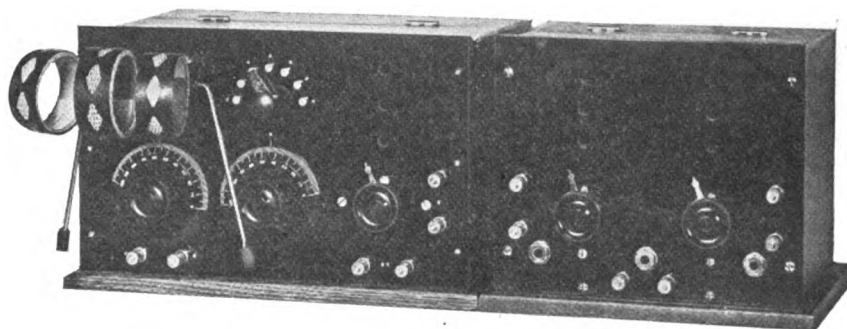
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The Live Wire Concert Receiver



Receiver and Amplifier for Concert Reception.

Hear All the Radio Concerts with This New Receiver and Amplifier

This new radio Concert Receiver and two-step Amplifier is the latest addition to our ever-growing stock of radio apparatus. It is an ideal instrument for spark and C.W. reception, and can be used for any wave length with the aid of the various sizes of honey-comb coils. The illustration shows the front view of the two instruments. One unit contains the tuner, condensers, switches and vacuum tube control. The other unit is a two-step amplifier. Both units can be connected together, thereby making this a complete tuner, detector and two-step amplifier. The variable condensers have 23 plates each. Rheostats and sockets are of Remler manufacture. The panel is of bakelite—highly polished. The necessary binding posts are mounted on the front of the panel. General Radio amplifying transformers, Federal Jacks and bus-bar wiring are the features of the amplifier unit.

This does not include honey-comb coils or vacuum tubes. We can supply these separately. All leading makes of tubes carried in stock.

Price \$80.00

San Francisco, Cal.

Separate Instruments

The illustration shows the two concert units ready for operation. Units can be purchased separately, if desired. The tuning cabinet and vacuum tube control, as illustrated are priced at \$37.50. No tubes or honey-comb coils are furnished at this price.

The two-step Amplifier unit can also be had separately at the cost of \$45.00, less tubes, "A" and "B" Batteries.

Cabinets are of oak, mission finish, with hinged top to allow inspection of the interior.

Everything for the Experimenter

1230 Polk Street

Special Sets a Specialty



Say Radio to the Advertiser, it will help you.

KEYSTONE RHEOSTAT



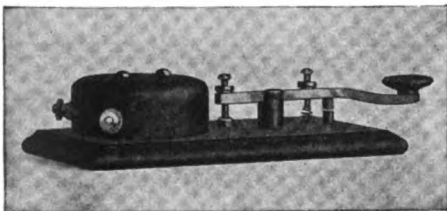
The "Keystone" is one of the finest constructed rheostats on the market, and is made of the best heat resisting and durable material possible to obtain. Neat in appearance, is $2\frac{1}{4}$ " diam., $\frac{3}{4}$ " deep, and $\frac{1}{4}$ " shaft. All parts are made of brass, and pointer is of heavy brass, nickel plated and polished. Resistance is 6 ohms, $1\frac{1}{2}$ amps. carrying capacity. Can be easily mounted on back of panel by only drilling two holes, also dial can be used, instead of the knob and pointer furnished. Resistance is wound tightly on an insulating strip and can not become loose. Sold on a guarantee of satisfaction or purchase price will be refunded.

PRICE \$1.25

Amateurs and constructors, don't miss sending 5 cents in stamps for our complete set of bulletins on raw materials, machine screws, wire, standard apparatus, audion and amplifying apparatus, and save money and time.

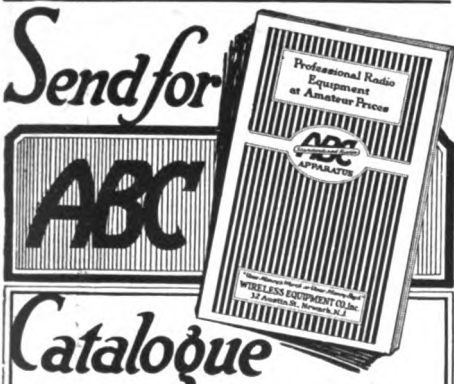
Keystone Radio Company
Greenville, Penn.

LEARNERS SETS



With code, instructions, and the AJAX BUZZER \$1.80.

60c—AJAX HYTONE BUZZERS—60c external tone adjustments. All postpaid. AJAX ELECTRIC CO., 8 Palmer St., Cambridge, 38, Mass.



A marvelously easy to understand instruction book on most advanced radio methods, because it describes in detail the unusual mechanical and electrical features and simplicity of the complete ABC line. Sixteen pages, clearly illustrated, in two colors. Every price quoted in this catalog represents a new low level for apparatus of recognized quality.

Send 10c for latest ABC catalog, "Professional Radio Equipment at Amateur Prices." Request Catalog CX11.

WIRELESS EQUIPMENT CO. Inc.
32 Austin Street, Newark, N.J.

CODFISH FOR CHRISTMAS

(Continued from Page 228)

Jones stood watching Johnny industriously oiling-over the engine, he reflected that the acute situation existing in Unga at the moment showed what a risky thing it would be to leave K-V-I in charge of an incompetent man. The only other wireless station in the Shumigans out of commission, gales and blizzards whipping the open sea into a maelstrom where no small vessel could live, and here an isolated village without food or coal in midwinter—where would its people be should the wireless fail? K-V-I must run.

And making K-V-I run was not any too easy. Only a few weeks before, a sending transformer secondary had gone up in smoke, and the last spare winding in the station was now on the transformer. It was not a very sturdy-looking secondary either, and had to be watched. If it were to shoot—

Johnny had the engine going now. Stepping over to the transmitter panel, Samuel Jones reached around behind to switch in a big auxiliary oil-condenser that he used in the closed circuit on the 2400 meter navy wave. The transmitter was controlled by an automatic break-in key mounted on the front of the panel; and as Samuel Jones worked shifting the condenser bus-bars, his elbow came against the armature-lever of the break-in key.

Instantly, the spark crashed in the gap—and Samuel Jones with his hands on bare bus-bars, jerked violently and doubled up like a jack-knife. He fell back upon the swiftly-running belt between the engine and the alternator, rode upon it a few feet, was hurled against an iron bench-vise at the opposite side of the room, and slumped to the floor senseless, a deep gash cut in the side of his head.

The spark had flamed in the gap but a mere instant. In that terrific involuntary jerk when he took the current, Samuel Jones had pitched the condenser connections together in confusion; and now a wreath of pale blue smoke curled up from the transformer secondary.

Badly-frightened Johnny had presence of mind and knowledge enough to pull back the jammed lever of the break-in key. Then he stopped the engine and went for help.

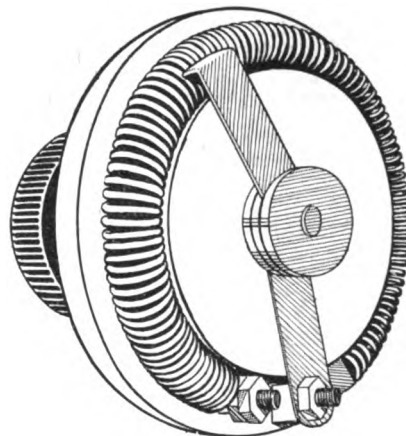
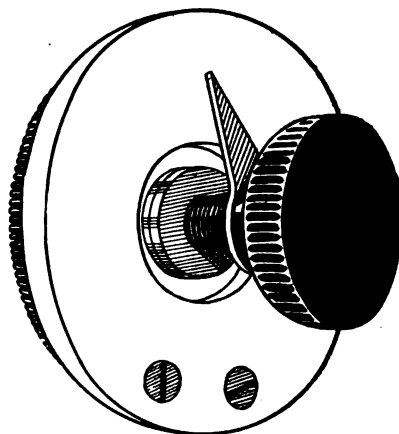
HALF-A-DOZEN fishermen carried Samuel Jones over to Old Judge's house on a mattress. There is no doctor at Unga; and in addition to his many other profitless duties, Old Judge is the village's first-aid.

But when Old Judge essayed to dress the wound in the operator's head, he saw that the injury was something too serious for him; it required the presence of a genuine doctor at once.

Old Judge went over to the station.

(Continued on Page 236)

Say Radio to the Advertiser, it will help you.

SHRAMCO
-- REO --

For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.
Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

A BACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height $2\frac{1}{2}$ in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt. Detector

and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, $2\frac{1}{2}$ in. base.

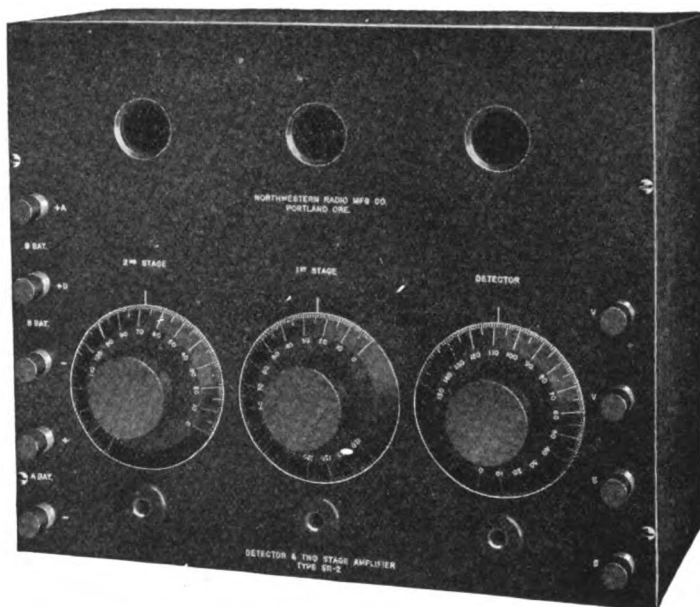
SHOTTON RADIO MFG. COMPANY

P. O. BOX 3, SCRANTON, PA.

Catalogue "K," listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

Detector and two stage amplifier Type SR-2.
Size of panel 10 1-2x12 3-4. Complete less
tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

Portland, Oregon

Prices Reduced on Eveready Wireless B Batteries

Eveready Wireless B Batteries, the long-lived, moisture resistant batteries that are designed and made especially for radio uses, are now offered at better prices. All of our wireless B Batteries are included in the reduction.

The new prices, effective immediately, are:

- No. 774—A 43-volt Battery with 6 positive terminals, allowing a range of from 18 to 43 volts in steps of $4\frac{1}{2}$ volts\$4.50
- No. 766—A $22\frac{1}{2}$ -volt Battery with 5 positive leads, giving a range of from $16\frac{1}{2}$ to $22\frac{1}{2}$ volts in steps of $1\frac{1}{2}$ volts.....\$3.00
- No. 765—A $22\frac{1}{2}$ -volt Battery with one positive terminal. A dandy Battery for beginners \$2.00
- No. 746—The big 108-volt Battery for amplification.....\$15.00

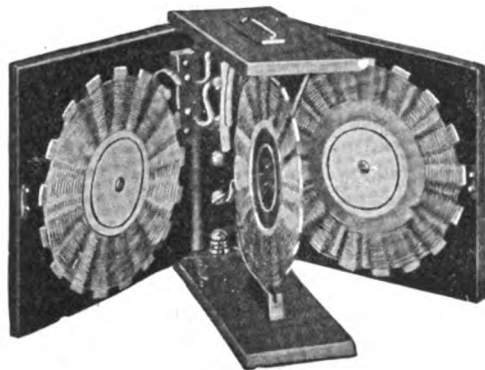
These batteries have made good. Amateurs and seasoned operators may specify Eveready Batteries with an assurance that they will be found equal to every demand.

National Carbon Company, Inc.

599 Eighth St., San Francisco, California.

Say Radio to the Advertiser, it will help you.

SPIDER WEBS



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

WONDERFUL
REGENERATIVE
SIGNALS

NO MAGNETIC
LEAKAGE

\$5.50
Plus 30c
Postage

NEW DUPLEX
1000 METER
SET ON HAND

HERROLD LABORATORIES

"Everything for the Amateur"

467 SOUTH FIRST STREET

SAN JOSE, CALIF.

Dubilier C. W. Condensers, Type 580

This latest addition to the already remarkably complete line of the Dubilier Condenser Company will meet a long-felt want of all amateurs interested in C. W. Transmission.



The Type 580 Dubilier Condenser is made in the following standard capacities:

Cat. No. 310—Triple capacity.	0.0003 Mfd.	0.0004 Mfd.	0.0005 Mfd.
	5000 Volts	4 Amps.	

The Type 580 is supplied also in the following single capacities:

Cat. No.	Capacity	Voltage
311	0.001 mfd.	5000
312	0.002 mfd.	5000
313	0.005 mfd.	2500
314	0.01 mfd.	2500
315	0.02 mfd.	2500

Prices on Other Capacities Upon Application

Pacent Electric Company, Inc.

150 Nassau St., New York City

"The Radio Telegrapher"

Official Organ
UNITED RADIO TELEGRAPHERS' ASSOCIATION
Room 303
44 Broad Street

Read about what's going on among the Commercial, Navy and Army operators

ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 Yearly, 15 Cents a Copy

CODFISH FOR CHRISTMAS

(Continued from Page 234)

Johnny explained as well as he could what had happened.

"An' that ol' black gillhooley with th' yellow doughnut thing on it blowed up again," he concluded, pointing at the burnt-out transformer. "It was th' last doughnut, too—there was some new ones comin' on th' 'Anangashak.'"

Looking at the secondary, fairly burned to charcoal, Old Judge saw that it was manifestly beyond hope. But a message had to be sent out some way—and quickly.

Going into the receiving room, Old Judge's eyes fixed themselves upon the half-inch spark-coil that Samuel Jones used for short-distance work. Old Judge knew there were no ships in the vicinity, and therefore no chance of raising anybody on that little coil, but the sight of it vaguely reminded him of something—he didn't know just what. For a long time he puzzled. Why, of course—the six-inch spark coil over in the postoffice!

Half-an-hour later, Old Judge had the big coil on the desk hooked up in the place of the half-inch instrument. The powerful coil worked splendidly on K-V-I's big aerial and for a time Old Judge called N-P-R hopefully, but with the approach of midnight he finally realized that he was not radiating enough power to possibly raise the naval station almost three hundred miles away.

Taking the coil off the storage-battery upon which he had been operating it, Old Judge connected it through a battery-charging resistance to the 110 volt exciting-generator current. A much heavier spark resulted, but still it was not enough. Old Judge heard N-P-R clearing N-P-Q on the 3 A. M. schedule; and though he called repeatedly he could not attract the navy operator's attention.

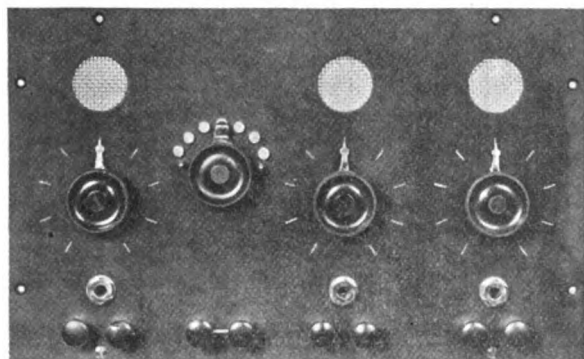
Old Judge reduced the resistance in the coil's primary circuit until the vibrator contacts arced heavily and grew so hot that Johnny, still faithfully on the job, had to cool the vibrator with a wet rag while Old Judge called again and again. The cold grayish light of a gloomy mid-winter morning found him still at the key, the big coil's contacts now quite burnt up, the vibrator ruined, and sticking hopelessly.

Old Judge spent the forenoon doctoring Samuel Jones. The injured operator was developing a fever; and Old Judge saw that help must come quickly.

With the germ of an idea in his head, that afternoon he went back to the station and studied the burnt-out transformer on the main set. Going into the receiving room, he attacked the big spark-coil with a screw-driver and took off the cover. Procuring a dish-pan, he set it on the stove and laid the coil in it to melt out the wax compound that filled the

(Continued on Page 238)

A Super Amplifier—



Front View of Detector and Two-step Amplifier

PRICES

Detector Panel	\$ 9.00, with Cabinet	\$12.50
Detector and 1-step Panel	\$22.50, with Cabinet	\$26.50
Detector and 2-step Panel	\$40.00, with Cabinet	\$45.00
Detector and 3-step Panel	\$55.00, with Cabinet	\$60.00
One-step Amplifier Panel	\$13.50, with Cabinet	\$16.50
Two-step Amplifier Panel	\$30.00, with Cabinet	\$34.00
Three-step Amplifier Panel	\$45.00, with Cabinet	\$50.00
Grid Condensers .....	.65 cents	

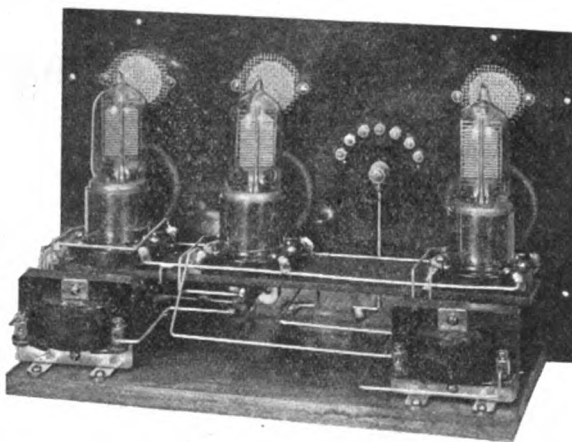
DEALERS! Write at once for our Profitable Trade Proposition.

Borch Radio Laboratory

716 Peralta Ave., Berkeley, Calif.

A complete new line of quality Super-Amplifiers and Detectors has just been developed by the BORCH RADIO LABORATORIES. These new instruments are unexcelled in design, efficiency, workmanship and ruggedness. Standard apparatus used throughout. Panels are of BAKELITE. All wiring is of the BUS-BAR type, nickel plated.

The two illustrations show front and rear view of the new Detector and two-step Amplifier. Note the compact arrangement of apparatus. Federal Jacks used for every step. Heavy nicked binding posts. You can't buy a better instrument at the price.



Rear View of Detector and Two-step Amplifier

MURDOCK No. 56 RADIO RECEIVER



2000 Ohm Double Set

3000 Ohm Double Set

\$5.00

\$6.00

**RELIABLE SERVICE—UNEQUALED VALUES
GUARANTEED TO SATISFY**

Sold on 14 Days' Trial—Money Back if not Satisfied
Send for Bulletin of Other Murdock Apparatus

**WM. J. MURDOCK CO., CHELSEA, MASS.
40 CARTER STREET**

509 MISSION STREET, SAN FRANCISCO

FORMICA

SHEETS - TUBES - RODS

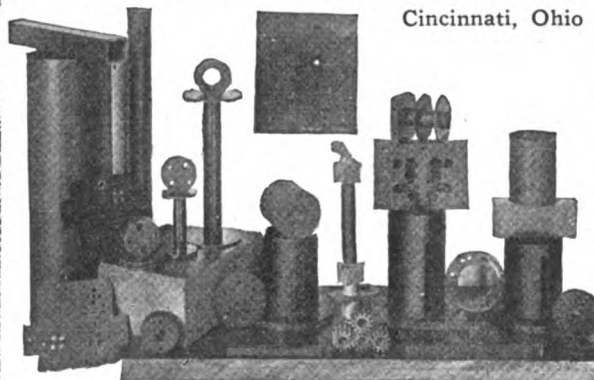
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:
Hermans-Griffith Co., Sheldon Bldg., San Francisco
Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco;
Wireless Shop, 511 W. Washington St., Los Angeles;
Northwest Radio Service Co., Seattle, Washington.

Say Radio to the Advertiser, it will help you.

Phone San Jose 2126-J

Established 1909
1200 Students

OUR WAR RECORD—200 Men Trained—130 Placed in Service

**HERROLD COLLEGE
OF ENGINEERING AND RADIO**SPECIAL ATTENTION TO EXPERIMENTERS
AND AMATEURS

467 South First Street

SAN JOSE, CALIF.

Best Christmas Greetings from Atlas

Fellow Amateur, when you sit with expectancy before that set on Christmas Eve and hear the gang come rolling in from far and near, just pause a minute and remember that behind a goodly portion of those signals are ATLAS TRANSFORMERS—wishing you radio's best.

ATLAS EFFICIENT TRANSFORMERS

Amplifying transformer\$ 5.00
Modulation transformer 5.00

POWER AND FILAMENT HEATING TRANSFORMERS

500 watt, 1000-1500 volts.....\$19.00
200 watt, 350-550, fil. 12 volts..... 15.00
50 watt, 375, fil. 10 volts..... 11.00
150 watt, fil. 10-12 volts..... 12.00
75 watt, fil. 8-10 volts..... 8.50

CHOKE COILS

1½ Henry, 500 M. A..... 4.00
1½ Henry, 150 M. A..... 3.00

RHEOSTATS

6 ohm. 1½ Amp.....\$1.00
6 ohm. 7 Amp..... 2.00
4 ohm. 16 Amp..... 5.00
CW. TUNING INDUCTANCES 25, 30, 35 turn.....\$8, \$9, \$10
DX-52 SPARK O. T.....\$25.00

RHEOSTATS

50 ohm. 3 Amp.....\$ 5.00
50 ohm. 7 Amp.....10.00
50 ohm. 15 Amp.....15.00

MAIL ORDER SERVICE includes all standard makes of apparatus
—sorted and tested vacuum tubes—all raw materials—quick service.

THE AMERICAN RADIO SALES AND SERVICE CO.
Mansfield, Ohio., U. S. A.

**—RADIO INSTITUTE—
OF AMERICA**

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

331 New Call Bldg., San Francisco

**CHRISTMAS
MONEY**

You can get that new Radio Apparatus for Xmas with the money that you earn by securing subscriptions to

"RADIO"

Write today for full information.
465 Pacific Bldg., San Francisco

**The "QSA" Line of Equipment
COMBAT**

A Storage Battery especially designed for Radio work. The only Battery with non-corroding binding posts. Write for particulars and incidentally get your name on our mailing list to receive our monthly bargain sheets.

Here is one of the many items listed for December:

Dry Cell B-Battery 45 volts \$1.85 ea.

INDEPENDENT RADIO SUPPLY COMPANY

3716 W. Douglas Blvd., Dept. P-12
Chicago, Ill.

"Better Results with Less Effort"

**CODFISH FOR CHRISTMAS
(Continued from Page 236)**

case. This done, he set about taking out the secondary, and after being forced to break the coil case to pieces, he at length got the winding out, intact.

With Johnny's help, he dismantled the sending-transformer, removed the burnt secondary, and attempted to put the spark-coil winding on in its place. Finding the transformer core much too large for this, he pulled the leg of the core to pieces and with a pair of snips cut a number of the soft iron laminations into strips narrow enough to enter the spark-coil secondary. After hours of tedious labor reassembling the iron core pieces,

BANG

Smashing "B" Battery Prices
"WIZARD"

**From Manufacturer to User
All Batteries Sent Postpaid****Announcing:**

Wizard's 2 new improved type "B" Batteries

No. 1632, 1 Tap, 45 Volt Variable Battery.
Size 6 in. x 5 in. x 2-38 in.
Price \$2.80. Weight 3¼ lbs.

No. 1630, 6 Taps, 27 Volt Variable Battery.
Size 6 x 3 x 2-38 in.
Price \$1.80. Weight 2¼ lbs.

These new types are not made of the same size cells as a small size "B" Battery. The volume of a cell used in these types is 4.7 cubic inches, as compared with 2.5 cubic inches, the volume of a cell used in the small "B's".

You can easily see that the life of these two types are almost double the life of the small "B's".

No. 1632 has one tap at 22½ volts.

These prices seem unbelievable, as do all other "WIZARD" prices, but are made possible only by dealing direct with the consumer.

Thousands are realizing the money that can be saved in the course of one year by purchasing from "WIZARD." Always remember we pay all P. P. charges. Write for Bulletin No. 6. Other "WIZARD" types:

Cat. No.	Size.	Taps.	Age.	lb.	Price
1623 Plain	3½x2½x2	22½	1	1	\$1.00
1623 Variable	3½x2½x2	5	22½	1	1.20
1625 Plain	6¼x4	x3	22½	5	1.85
1625 Variable	6¼x4	x3	5	22½	2.25
1626 Plain	6¼x8	x3	45	10	3.75
1626 Variable	6¼x8	x3	6	45	4.15

Send all money orders to

Wizard Battery Co.

1315 42nd St. Brooklyn, N. Y.

Dept. R

he at last had the transformer back in its mounting with the improvised secondary connected into the set.

Johnny started the engine. After getting the condenser connections straightened out, Old Judge carefully cut the alternator voltage down to the lowest limit and gingerly pushed over the lever of the break-in key on the panel.

A spark, rather small, but smooth and clear, flashed across the teeth of the synchronous-gap; and the hot-wire ammeter climbed up to five amperes. After testing a few minutes, Old Judge felt the secondary winding and found it still cool. He had studied his books enough to understand that the fine wire with which it was wound was liable to melt instantly if too much current were pulled from it. Gradually raising the alternator voltage, he brought the ammeter reading up to seven amperes before the secondary began to feel warm.

Trembling with excitement, Old Judge hastened into the receiving-room and listened in. He heard no signals, but it was still early in the evening and the navy operators would be on the job. Old Judge grasped the key and shakily called N-P-R.

There was no response.

Again he called, and yet another time, followed by a C-Q, but still no answer. A cold fear clutched at Old Judge's heart for a minute; then he discovered that no signals could be brought in anywhere on the tuner. He had seen Samuel Jones have the same trouble and he knew just where to look. Hurrying into the power-room, he examined the break-in key. Industrious Johnny had over-oiled the key-armature; and the lubricant had gummed the contacts on the receiving side.

Quickly cleaning the key, Old Judge returned to the receiving set and got the phones on just in time to hear the familiar spark of N-P-R coming in strong. The sending had an angry snap in it.

"Say, didn't I tell you to keep off that key, you confounded old lummo!" the gob was yelling. "Get out 'a there an' stay out—you spoil th' air!"

Old Judge was nervous and frightened, but he was not to be bluffed this time. With gritty determination, he steadied his shaky wrist.

"Excuse me, N-P-R," he replied. "I know you don't like to work with me, but S-J is hurt. Will you take a message to the revenue service?"

The gob came back on the air and spluttered around apologetically for a moment.

"Awright," he finally returned. "You seem to have improved a little since last time, anyway—guess we can get along."

IT WAS Christmas Day—an Alaskan Christmas Day, cold and quiet, with the big white snowflakes falling thick and fast, piling the smaller (Continued on Next Page)

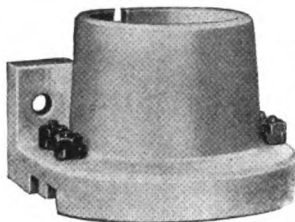
CROSLEY

RADIO APPARATUS

"BETTER—COSTS LESS."

A SMASHING HIT

Crosley V-T Socket



60c

"Better—Costs Less"

Here are the reasons why this socket won instant popularity

—why it was the hit of the Chicago Radio Show—why today it is the biggest seller.

It's the only socket made for both base and panel mounting. It's made in one piece, entirely of porcelain—there is no metal shell—hence no "ground hum". Its design eliminates possibility of short circuiting filament across high voltage "B" Battery. It is better—and costs only 60 cents.

Be sure to use CROSLEY SOCKETS in the radio set you are building. Every live dealer handles them—if yours doesn't, send us his name and order direct—we will ship prepaid.

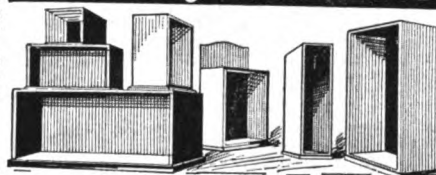
Harko Radiator Receiver



Complete with battery and interrupter for crystal testing, crystal, etc. Price \$9.00. Phones extra. DEALERS: This will help you get 'em started.

No batteries, tubes, etc., required. Hook it to your aerial and phones. It will tune from two hundred to six hundred meters, bringing in spark, voice, and music, with an average amateur aerial.

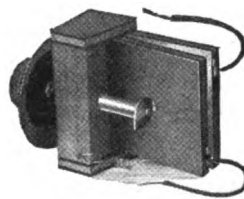
Crosley Cabinets



The Crosley Variable Condenser

(Pat. Pending)

"BETTER—COSTS LESS."



This Condenser works on an entirely new principle. The two plates are hinged and are opened and closed like a book by means of a specially designed cam. The plates are surfaced with copper. One copper sheet is covered with mica so that when the two plates are clamped tightly together the maximum capacity is obtained. The maximum capacity of this Condenser will average about .0008. We rate it conservatively, however, at .0005.

This Condenser has several advantages over the ordinary type of air condenser. Will stand 1000 volts without breaking down. It can therefore be used for C.W. work. Has no body or hand capacity effect. Has much greater signal strength due to the fact that mica is a much more efficient dielectric than air. The calibration curve of this Condenser is almost a straight line. Has unusually low zero capacity—.00006.

Price without knob and dial.....\$1.25
With knob and dial.....1.75
Mounted in cabinet with knob and dial.....2.50

Sold on a GUARANTEE of absolute satisfaction or money refunded.



The tendency in the radio field today is to put apparatus in cabinets not only for appearance's sake, but as a protection from dust, dirt, atmospheric conditions, etc. Realizing the demand for attractive stock cabinets of various sizes, we are building them in quantities in our large wood working plant. These cabinets are all uniform in style. The panels are rabbeted in to the front. As the outside dimensions and inside dimensions are either larger or smaller than the panel itself, we show panel size and also inside dimensions. Prices quoted do not include the panels. All cabinets are waxed antique mahogany finish. Wood used is either gum, genuine solid mahogany or quartered oak. Lids or tops are hinged. Sizes and prices are shown below:

For Panel Size	Inside Dimensions			Mahogany or Quartered Oak	
	High	Wide	Deep	Gum	Quartered
6x7	5 1/2"	6 1/2"	7"	\$2.50	\$3.85
6x10 1/4	8 1/2"	10"	7"	2.75	4.40
6x14	8 1/2"	13 1/2"	7"	3.30	5.55
6x21	8 1/2"	20 1/2"	7"	3.80	7.30
8x14	8 1/2"	13 1/2"	10"	3.70	6.80
12x14	11 1/2"	13 1/2"	10"	4.40	6.80
12x21	11 1/2"	20 1/2"	10"	5.25	10.80

Cash must accompany order. No C.O.D.'s. We pay transportation charges.

We can furnish genuine formica panels 3/16" thick, cut to the following dimensions: 6x7; 6x10 1/4; 7x9; 6x14; 7x12; 6x21; 7x18; 9x14; 12x 4; 14x18; 18x21. Price of panels—2 1/2c. per square inch. For odd sizes order the next largest size; we will trim. We pay postage.

Every article bearing the name "CROSLEY" is GUARANTEED to give absolute satisfaction or money will be refunded.

We shall be pleased to send literature describing the above mentioned and other radio apparatus to any one free of charge upon request. Get your name on our mailing list to receive latest Bulletins of other new Crosley products. If your dealer does not handle our goods, order direct and send us his name.

Dealers: It will pay you to handle our line. Write for particulars.

CROSLEY MANUFACTURING CO.

Radio Dept. P-2

Cincinnati, O.

GET ON OUR MAILING LIST

Our monthly Bargain Circular Contains dozens of Holiday Suggestions. Write for it now.

WESTERN WIRELESS WORKS, 1972 San Pablo Ave., Oakland, Calif.

VISIT OUR NEW STORE

Say Radio to the Advertiser, it will help you.

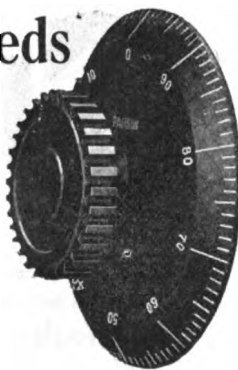
Everything Your Boy Needs for His WIRELESS Set

From the simplest outfit for the beginner to the larger plant of the ambitious and more expert amateur operator—everything will be found in our **Wireless Department**.

Aerial Wire, stranded.
Magnet Wire, enameled and cotton covered.
Audion Globes.
"Eveready" Wireless "B" Batteries.
"Eveready" Storage Batteries.
Detector Panels.
"Bakelite" Dials and Knobs.
Variable Grid Lenks.
Amplifier Panels.
Q. S. A. Coils, mounted and unmounted.
Variocouplers—Variometers.
Contact Points, Binding Posts.



Our wireless service man is always pleased to give helpful advice in making up the most efficient sets possible at a minimum cost. Just call or write our "Wireless Department."



Chas. Brown & Sons

871-873 Market St., Opp. Powell

San Francisco Sutter 6030

Everything for the Amateur Wireless Operator

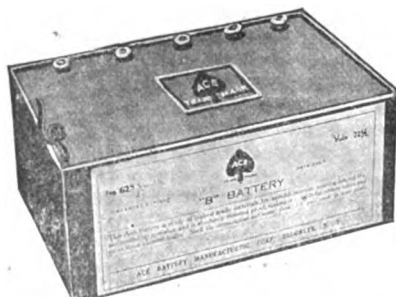
LONGER LIFE
MORE THAN A TRADE MARK
BETTER SERVICE
A SIGN OF "B" BATTERY
QUALITY



The new "Ace" # 627-45 Volt Variable "B" Battery is rapidly creating a remarkable reputation as to "Price," Quality, Service and Weight. The special size cell construction guarantees from 50% to 75% longer life than any 2 small size "B" Batteries. 16 Taps, 30 Voltage readings of from 1 1/2 to 45 Volts obtained. Absolutely the best "B" Battery offer ever made. Size 6 in. x 5 in. x 2 3/8 in. —weight, 3 3/4 lbs. Price, \$3.50. Demand "ACE." If your dealer does not carry "Ace" write to us. This list contains the six popular type "ACE" "B" Batteries.

Cat. No.	Size	Voltage	Lbs.	Taps	Price
623 Plain	2 1/2 x 2 x 3 3/8	22 1/2	1		\$1.50
623 Variable	2 1/2 x 2 x 3 3/8	22 1/2	1	5	1.75
625 Plain	3 x 4 x 6 3/8	22 1/2	5		2.50
625 Variable	3 x 4 x 6 3/8	22 1/2	5	5	3.00
626 Plain	3 x 8 x 6 3/8	45	10		5.00
626 Variable	3 x 8 x 6 3/8	45	10	6	6.00

**NO RADIO
SET
COMPLETE
WITHOUT
"ACE"**



**BEST
IN
"B"
BATTERIES**

Write for Cat. # 26. Ace Batteries are silent, moisture proof and absolutely guaranteed. DEALERS—Get in on this fast selling item.

264 Atlantic Ave. ACE BATTERY MFG. CORP. Brooklyn, N. Y.

CODFISH FOR CHRISTMAS

(Continued from Preceding Page)

drifts into big hills and building the big hills into great white mountains.

Samuel Jones, wearing a bandage around his head, but otherwise quite his usual self, sat in Old Judge's den reading a magazine and soaking in the mellow warmth that pervaded the room. The heater glowed redly, and a big bucketful of coal stood waiting beside it; for the superintendent of the codfish company argued that since hardly any fuel was being used out in the wireless station, Old Judge was entitled to free coal for his house.

Excited juvenile shouts out in the village attracted Samuel Jones' attention; and looking out through a window, he saw two obstreperous young Alaskans on the opposite hill-side fighting frantically for possession of a shiny new coaster-sled, while a dozen or so youthful spectators all clutching big brilliantly-striped sticks of candy in their mittened fists, looked on and yelled at the top of their lungs.

Samuel Jones suddenly turned around and sniffed, expectantly. From the kitchen, where Old Judge was bustling about with a great stir, there emanated a Christmassy odor of turkey and cranberry.

"By jingo, it's a funny thing—somehow I can't feel very sorry over havin' got this gash in my bean," remarked the ex-operator of K-V-I, a little later as he jabbed his fork into a big piece of delicious white meat. "Mebbe I'm a kind of a fatalist; but someway I always figure that everything turns out for the best."

Old Judge gazed fondly at the regenerative receiver, the long-wave tuner and the two-step amplifier, all glittering in magnificent array on the little table in his den; and he felt that perhaps Samuel Jones was right.

CALLS HEARD AT 70Z, G. LEWIS, 1745 WILLAMETTE, EUGENE, ORE.

All CW unless otherwise specified. One stage: 2TT, 2WJ, 4ARK, 4CB, 5AT-sp., 5ZA-sp., 6MK, 6WV, 6XAC, 6XC, 6XAD, 6XG, 6XKA, 6ZH, 6ZN, 6AAT, 6ABX, 6ALE, 6OO, 6ALO, 6ARC, 6ASJ, 6AUL, 6AWV, 7CE, 7XF, 7TQ, 8BOX, 8GV, 8UJ, 8XM, 8IJ, 8PR, 9AAU-sp., 9ANP-sp., 9AUP, 9AGN-sp., 9ARG-sp., 9VH, 9AYV, 9AEG, 9FR, 9UN, 9XI, 9AUO-sp., 9AMB, 9ZY, 9AK, 9ZN-sp., 9RT.

Daylight sparks: 6AK, 6BM, 6CZ, 6CP, 6DG, 6FH, 6GF, 6GR, 6IC, 6JE, 6HN, 6OC, 6PR, 6QR, 6TU, 6AFN, 6ALW, 6ATV, 6AUD, 6AVB, 7CE-CW, 7IN, 7KS, 7MP, 7MO, 7TQ-CW.

Well, fellers, how do you like 7MF? His spk is reaching out. He is of the opinion that he worked 9AGN the other day, but is waiting for verification.

70Z has only a 150-watt st. gap set now. Going to put in 1 K.W. soon. 7HF has come to life and is working everywhere, at last. Something like 6AS used to be. 7IW is still hammering away with his half. 7SR will be on with 1 K.W. soon. That will make five relay men here, although 70Z and 7MF will devote some time to calling nines. We have very good results in Eugene now, as a glance at calls heard will show. 2TT has been heard consistently by almost everybody in town. There is some slight trouble here due to local qrm from 6QR, who is audible at 70Z, over 200 feet from fones. Let's have a description of 6QR.

Wishing "RADIO" continued success,
GARRETT LEWIS.

Say Radio to the Advertiser, it will help you.

KENNEDY
EQUIPMENT

QUALITY PRE-EMINENT

*Kennedy
Type 220
Intermediate-Wave
Regenerative
Receiver*



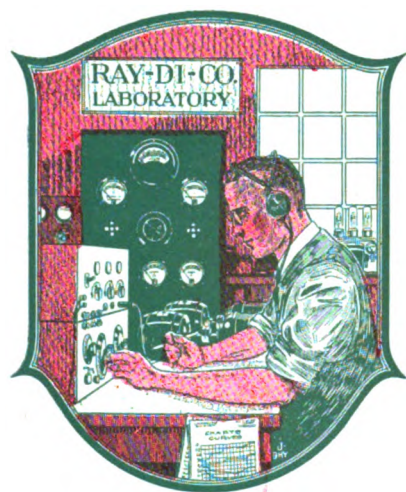
*Licensed Under
Armstrong
U. S. Patent
No. 1,113,149*

THE enviable reputation possessed by Kennedy radio receiving equipment has been built up by strict adherence to the very highest standards of quality.

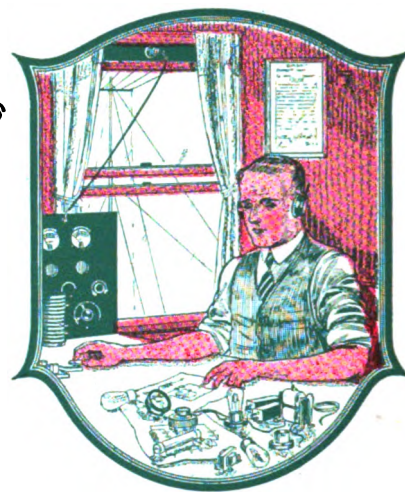
WE have been equally careful in the selection of our distributors. The purchaser of Kennedy Equipment must have service in keeping with the quality of the apparatus and we have therefore chosen only firms of the highest standing to represent us. Arrangements are being made for other distributors in centers where we are not as yet represented. Our present distributors in some of the large cities are listed below:

BALTIMORE.....	JOS. M. ZAMOISKI Co.
CHICAGO.....	COMMONWEALTH EDISON CO.
CLEVELAND.....	THE NEWMAN-STERN CO.
DENVER	REYNOLDS RADIO CO.
DETROIT.....	WM. J. HARTWIG CO.
KANSAS CITY.....	CENTRAL RADIO CO.
LOS ANGELES.....	ELECTRIC LIGHTING SUPPLY CO. AND SOUTHERN CALIFORNIA ELECTRIC CO.
MINNEAPOLIS.....	STERLING ELECTRIC CO.
NEW YORK.....	MANHATTAN ELECTRICAL SUPPLY CO.
PHILADELPHIA.....	FRANK H. STEWART ELECTRIC CO.
PITTSBURGH.....	DOUBLEDAY-HILL ELECTRIC CO.
ST. LOUIS.....	MANHATTAN ELECTRICAL SUPPLY CO.
SAN FRANCISCO.....	WARNER & LINDEN
SEATTLE.....	H. E. WILLIAMSON ELECTRIC CO.

THE COLIN B. KENNEDY COMPANY
INCORPORATED
RIALTO BUILDING
SAN FRANCISCO



SOS Your Problem to Us



C. W.
10 WATTS



SPARK
1000 WATTS

The Question of the Day

Which Will YOUR Station Be?

Do YOU believe in NOISE, HIGH VOLTAGES, BLINDING FLASHES, BROAD INTERFERING WAVES, or do YOU appreciate the fact that a LOW POWERED C. W. set will cover great distances with little or NO NOISE, comparatively LOW VOLTAGES and with the additional feature of TRANSMITTING the VOICE, beside ELIMINATING the Q R M by means of sharply tuned waves.

What Is the Answer?

COMPARE THE TWO SYSTEMS WATT PER WATT, WHAT IS THE ANSWER?

INVESTIGATE THE COMBINATION OF THE PARAGON RADIO TELEPHONE AND THE RAY-DI-CO 40-WATT MOTOR GENERATOR. IT WILL PAY YOU.

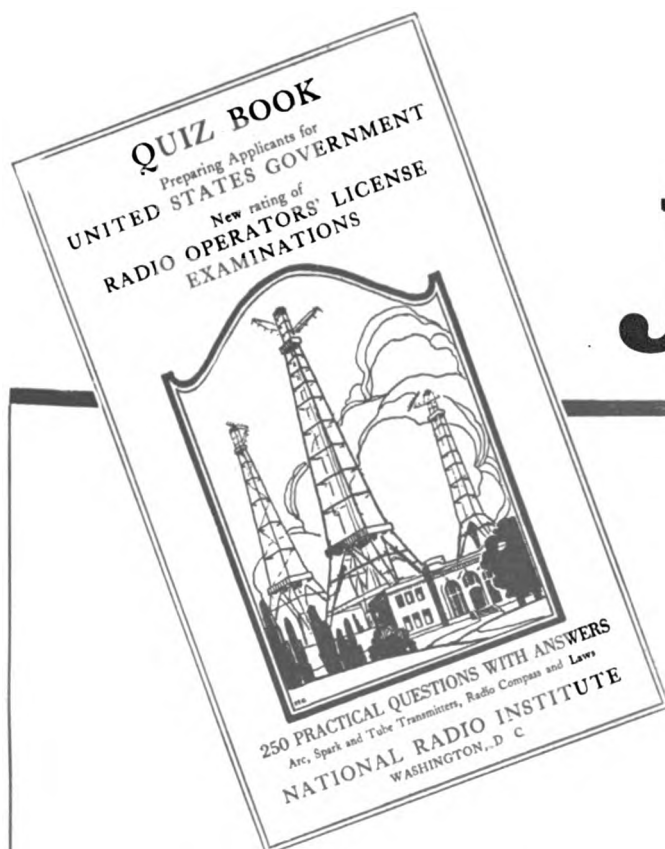
Our Mail Order Department

RAY-DI-CO NOW CARRIES A COMPLETE LINE OF ALL STANDARD RADIO EQUIPMENT AND GIVES PARTICULAR ATTENTION TO MAIL ORDERS.

The Ray-di-Co Organization

Distributors of Paragon Products and Connecticut Electric Apparatus

H. H. BUCKWALTER, 713 Lincoln St., Denver, Colo., Mid-West Representative.



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U. S. Government License Examination Questions Answered!

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Life and Duties of an Operator.
Terms and Definitions.
Radio Instruments.
Transmitters, Covering Spark, Arc and Tube Sets.
Types of Antennae and Aerials.
Damped Wave Receivers.
Latest Types of Undamped Receivers.
International and U. S. Radio Laws and Abbreviations.
Radio Compass and Its Uses.
Exhaustive Treatises of the Storage Battery.
Helpful Equations and Tables for Solving Radio Problems.
Continuous Wave Receivers.
Valuable Information to Help You in Securing Your License Examination.

THIS BOOK, "New License Quiz Book for Gov't First Class License Examinations," is the first edition printed with the new rules, regulations and gradings laid down by the Government on July 1, 1921. Every amateur expecting to take examination for license needs this book. It gives the answers to 250 questions, many of which will be helpful in the examination. It gives practical equations, international laws and regulations, official gradings, diagrams, definitions and other important information,—invaluable to the candidate for government examinations.

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WHETHER you are making this a Radio Christmas for others or expect a Radio remembrance for yourself, direct the purchase to the SORSINC Stores whose spirit of helpful service is in accordance with the Christmas Season.

SHIP OWNERS RADIO SERVICE, Inc.

Largest Radio Chain Store in the World

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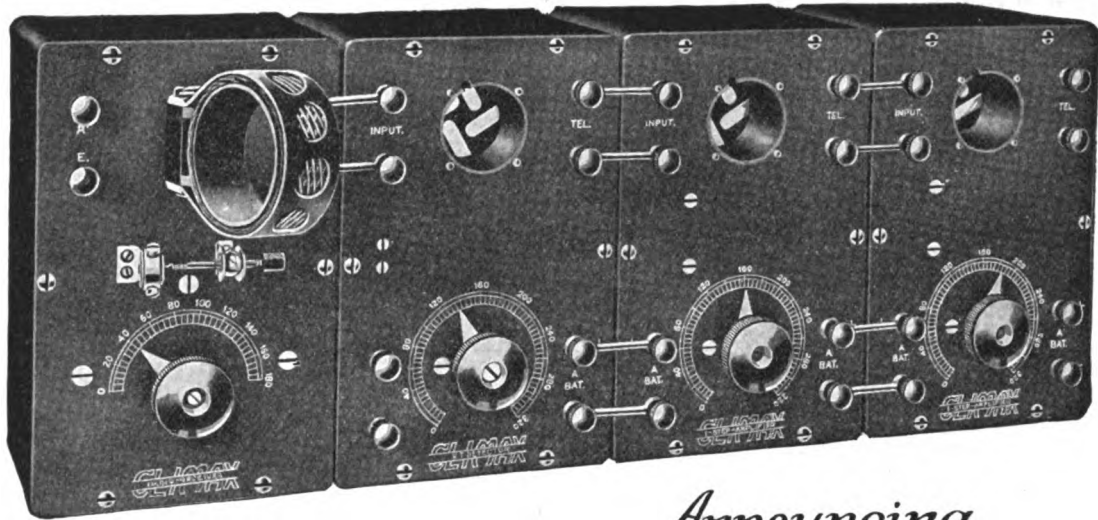
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EVERY COMBINATION OF CLIMAX UNITS RECEIVES ALL CLASSES OF SIGNALS, WIRELESS TELEPHONE AND TELEGRAPH



Announcing CLIMAX UNITS

at rock~bottom 1922 prices~

YOU CAN NOW get all the splendid performance of ABC UNITS at un-heard-of low prices.

For CLIMAX UNITS, tho' costing less, bring you every necessary feature for a commercial-grade receiving station. The illustration shows the CLIMAX receiver, VT detector, and two one-step amplifiers, hooked together to form one compact, result-getting set. This entire outfit sells for only \$54.25 (less tubes and batteries.) You can buy one Unit at a time, and yet get remarkable results from each succeeding combination as you go along.

In quality, CLIMAX UNITS equal any sets on the market. Genuine Condensite insulation is used for the condenser heads. The receiver comes to you equipped with the No. 25 ABC Coil (range 150 to 300 meters). Larger coils may be instantly snapped into the mounting, giving you unlimited wave-length range. ABC Saco-Clad transformers used in the amplifier Units, make six steps entirely practical without howling or squealing. Remember, these Units are completely enclosed cabinets, with a handsome Kodak-finish that you will be proud to show to your friends.

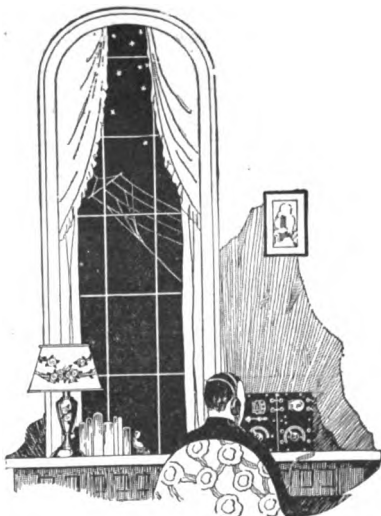
Quantity production of three simplified models, based on 1922 prices for raw materials, saves you 50% or more of what such instruments would otherwise cost. Here's your opportunity to build up your set and save money. Order one or more Units direct from this ad. Immediate delivery. Prices include postage to any part of the U. S.

WIRELESS EQUIPMENT CO., Inc.
Dept. R12, Newark, New Jersey

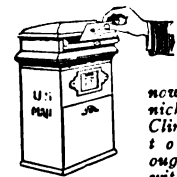
CLIMAX

RADIO RECEIVING
UNITS

Receiver \$13.50
Detector 11.25
Amplifier 14.75



CLIMAX UNITS
are made by the makers of the famous ABC Units. They fulfill the Wireless Equipment Co.'s slogan, "Professional Radio Equipment at Amateur Prices," and are backed by our unequalled guarantee, "Your Money's Worth or Your Money Back!"



If you don't want to order now, send a nickel for the Climax Bulletin, to d a y. You ought not to be without it, and we'll send it at once. Do it now, before you forget. Wireless Equipment Co., Inc., Dept. R12, Newark, New Jersey

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BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls, from .005" to .020" thick.

Let us show how our standard products can be made to solve your insulation problems.

Pacific Coast dealers carry a full stock of Bakelite-Dilecto, Vulcanized Fibre, Continental-Bakelite and Conite.

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DUCOMMUN HARDWARE CO., 219 Central Ave., Los Angeles, Cal.

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C. W. Condensers

.0004 M. F. \$4.75

.0006 M. F. 5.50

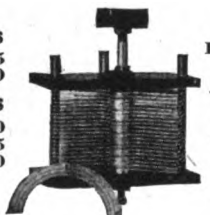
K. D. Condensers

11 Plate.....\$1.80

21 Plate..... 2.25

41 Plate..... 3.20

Add P. Post



Tresco Binding
Posts, 10 for \$1.00
Add P. P.

A 24-Page Catalog for 10c

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Davenport, Ia.



Radio Supplies Complete Stock Snappy Service

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Murdock Sockets..... 1.00
Remler Jr. Rheostat..... 1.00
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Power Tubes, A. P. & Cunn-
ham 8.00

Send for Price List

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IN DESIGNING

THE PARKIN DIAL RHEOSTAT (pat. pending) and by mounting the resistance element in a circular groove in the back of a 3" molded Bakelite dial eliminated one part and saved you the cost of a dial. The groove being recessed, allows the dial to clear the panel by the usual distance of 1-16". An off position is provided and a stop on the dial engages the stationary contact at the extreme positions. The 360-degree rotation insures fine adjustment. A brass bearing insures a true running dial and smooth action.

All figures and graduations are filled with brilliant white enamel. All brass parts nickel plated. Bakelite knob. Resistance is 5 ohms, carrying capacity 2 amps.

No. 77 Parkin Dial Rheostat, postpaid.....\$1.75

FOR SALE BY ALL LEADING DEALERS.

Send for free catalog, No. 3, describing our complete line.

Dealers: Write for proposition.

PARKIN MFG. CO.

SAN RAFAEL, CALIF.

PROMOTING SALE OF RADIO EQUIPMENT

(Continued from Page 196)

chased by people who are willing to spend from \$200 to \$400 for high class equipment. Receiving sets are installed at the Claremont and Mt. Diablo Country Clubs, and last week when the world series baseball returns were being sent out from our station at the California Theatre—every ball and strike just as fast as you saw them posted on the newspaper bulletin boards—the players out on the golf course could hear these returns over a mile from the club house, through the use of a Magnavox similar to the one we have here.

Let me tell you a little more of what the radio jobbers and manufacturers are doing locally to create demand. There are five radio telephone stations in operation within 40 miles of San Francisco, on different time schedules and wave lengths, so that it is possible to receive at least two and often as many as five radio concerts a night in every home. Grand opera concerts were broadcasted by radio twice this year from our California Theatre station and from the Meyerberg station at the Fairmont Hotel. These concerts were received over distances upwards of 1000 miles. The returns of the Dempsey-Carpentier fight, Sunday morning symphony concerts, and Sunday sermons by clergymen—you see you may have your choice—have been other special features. Semi-technical talks with demonstrations have been given before all the local business organizations. The public is being sold to radio. All that is needed is to round out distribution, and the electrical trade is the logical medium to accomplish this.

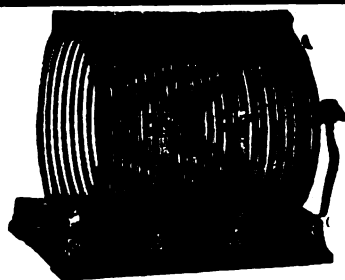
There are between 400 and 500 stores handling radio apparatus in the United States today, but this is not enough. More dealers are needed. Let us see what requirements the radio dealer must meet—a stock investment of from \$500 to \$1500, which can be turned over rapidly, and, as I have said before, a salesman who knows the line. There are about 12,000 electrical dealers and jobbers with retail departments and 3000 central station companies selling electrical merchandise in this country. This gives a total of 15,000 possible distributors for radio apparatus. This number is not too great because there are 700,000 bona fide amateurs as well as your farmers and private home users to reach. Needless to say, those of you who get in at the start are the ones who will reap the greatest profits. Let your radio department grow up with this business and your profits will grow likewise.

RADIO APPARATUS

Send 10 Cents for Catalog—Money Credited on First Dollar Purchase

Empire Radio Equipment Co., 271 West 125th Street, New York City, N. Y.

Say Radio to the Advertiser, it will help you.



C. W. Oscillation Transformer
\$11.00



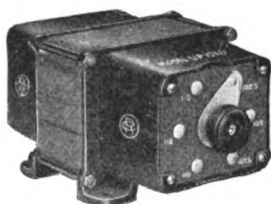
50-Watt Radiotron
\$30.00



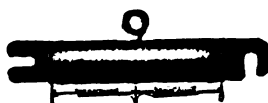
5-Watt Radiotron
\$8.00

C. W. APPARATUS for the Radio Amateur

Have you received your copy of the new
catalog of Amateur Radio Equipment?



750-Watt C. W.
Power Transformer
\$38.50



C. W. Transmitter
Grid Leak
\$1.10

The instructions given in the catalog enable the radio novice to place a Tube Transmitter into practical operation within a few hours after delivery of the equipment. Either telegraph or telephone communication can be obtained by connecting Radio Corporation sets directly to an A. C. power source.

The illustrations shown here cover a few of the

Radio Corporation's C. W. accessories now available at your nearest dealer.

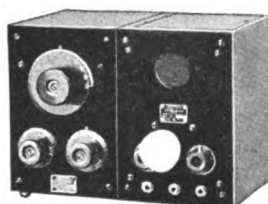
The Radio Corporation's C. W. Tube Transmitters consist of scientifically co-ordinated parts, which, when connected together provide a thoroughly reliable C. W. Tube Transmitter. All uncertainty of operation is eliminated. The demand for R. C. A. Continuous Wave Apparatus is unprecedented.



325-Watt C. W.
Power Transformer
\$25.00



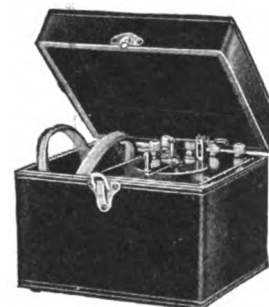
.002 MFD—C. W.
Condenser
\$2.00



Receiver for "DX"
Work
\$125.00

The two Receivers illustrated here have met with instant favor in the amateur field. The "Aeriola Junior" is the ideal set for the beginner or the novice. The type RC Receiver is pre-

eminently the most suitable set for "DX" stations. Watch our advertisements for future announcements which will be of the utmost importance to radio experimenters.



"Aeriola Jr."
Receiver
\$25.00

If you have not already secured your copy of our combined instruction book and catalog, send 25 cents today to
Sales Division, Commercial Department, Suite 1804

FOR RECEPTION

Radio  **Corporation**
of America

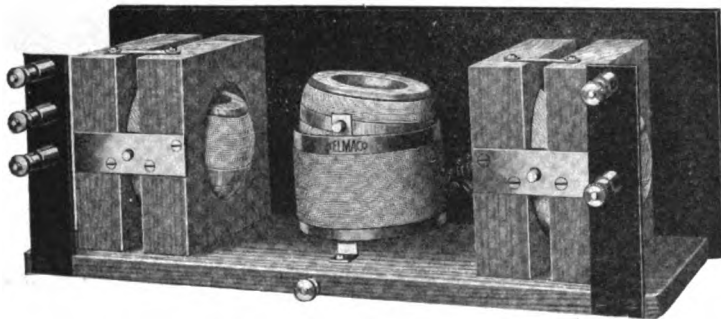
233 Broadway, New York City

Say Radio to the Advertiser, it will help you.

Discriminating **TELMACO** Radio Men Insist on Telmaco Short Wave Receivers



Telmaco's policy is to give better values. That's why we are forced to work overtime to fill orders. The Telmaco Short Wave Receivers are completely assembled; lugs are in place on which to solder wires; No. 14 silver finished wire, as well as necessary tubing is furnished.



The Cabinet is constructed of quarter sawed oak, stained inside and out, with waxed finish. Panel is of grade M 3/16 in. Formica, 6 1/4 in. x 16 1/4 in. satin grained finish, mounted on special drawer sub-base. Metal parts are nickel plated and oxidized. Binding Post Construction is of Telmaco special design extending through back of cabinet, thus removing all external wiring from front of panel.

TR-1 Telmaco Short Wave Receiver, Unwired.....\$35.00
TRD-1 Telmaco Short Wave Receiver and Detector Combined, unwired.....\$45.00

Telmaco Variometers and Vario-Coupler with flush type bearing plates and spring washer bearing contactors are used, thus assuring perfect electrical connections, permanently for ball windings without "pig-tailing." Dials are Remler 3-in. polished molded bakelite. Lettering on panel in pantograph machine engraved, filled with the best grade white enamel.

DETECTORS AND AMPLIFIERS

to match the above. Same general construction, height and depth. All amplifying transformers fully mounted and all amplifying units furnished with full Automatic Filament Control jacks, and special Radio plug.

Type Td-1 Vacuum Tube Detector Unit	\$15.00	Type TDA-1 Detector and Single Stage Amplifier Unit	\$35.00
Type TA-2 Two-Stage Amplifier	\$40.00		
Type TDA-2 Detector and Two Stage Amplifier	\$45.00		

SPECIAL BEGINNER'S SET

Telmaco's beginner's complete receiving outfit includes 2000 ohm double phones, detector, mineral, condenser, double slide tuner, 160 ft. aerial wire, insulators, and book of instructions. A first class outfit. Very popular. Price \$12.00.

Order Direct From This Ad.

Satisfaction guaranteed always or money refunded. Send for our complete, catalogue, "P." You'll find it interesting.

DEALERS! We are distributors for nearly all Standard Lines. Write for our Special Proposition.

Your Panels engraved with our Gorton Engraver. Price 5 cents per letter. Minimum charge \$2.00.

Radio Division

Telephone Maintenance Co.

17 N. LaSalle Street, Chicago, Ill.

LETTERS TO THE EDITOR

(Continued from Page 199)

more satisfactorily and efficiently ten years ago than it is at present? Can he prove that ships such as the Matson fleet enjoyed the "quick come back" when far out at sea, or the selectivity of tuning, as they do at present, when using the old Type D tuner, crystal and old straight gap of 1910 or 1912? We are not old operators, having been at sea only seven years, but we have operated the misconceptions of the United and Shoemaker Wireless Telegraph Company, and have watched the growth and improvements of radio during the years. Although freak distances were occasionally covered with these old sets, directly coupled, with a decrement unlimited and waves as broad as the Pacific; still we must remember that at this early date there were comparatively few ships equipped with radio on the Pacific, and the coast stations would spend hours and even nights to make a record, as they then had no other traffic to handle.

We admit that there are some so-called operators who make their station an experimental laboratory, who dismantle their apparatus to conform to their own ideas of efficiency (?) and who bring discredit on the entire profession. This type of operator was as prevalent at the initiation of radio as he is at the present day, and is no argument against the profession as a whole. The fault lies with the employer. Is it necessary that they hire one of these incompetents to go out in charge of a ship's radio when there are many capable operators out of work? Perhaps they do everything within their power to get rid of these men, but there will always be a certain percentage of this class, no matter whether they are using their own or ship's apparatus.

We know of no instances where commercial operators have spent \$300 to \$400 for the privilege of hearing POZ on the Pacific, as Mr. Soderstorm states they do, but we do know of many who have invested \$30 or \$40 to enable them to get reliable time signals, press broadcasts and hydrographic information on offshore voyages. Many of these had the necessary apparatus at home on their amateur sets. There is no need of dismantling the regular set to set up an audion. About two leads may have to be changed to receive on either audion or crystal, so there is no chance of the "private apparatus" interfering with the operation of the equipment provided. It is the practice on many ships for operators to have entirely separate receivers for long wave. A single lead to the antenna is the only additional connection to the installation, and while the operator receives his press through one ear piece, the other remains connected to the ship receiver and the

(Continued on Page 250)

Say Radio to the Advertiser, it will help you.

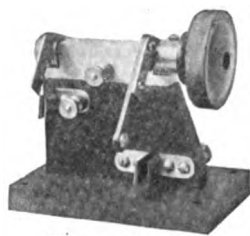


"Signal" Radio Apparatus Pleases Professional and Amateur

Because it is built to the exacting requirements of the professional radio-electrician, SIGNAL wireless products are bound to fulfill every requirement of the exacting amateur. And the name SIGNAL is the only thing to be certain of in buying!

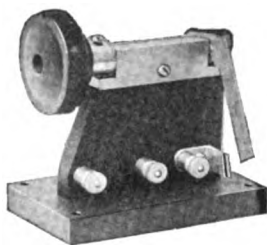
AERIAL CHANGE-OVER SWITCH

Reduced to fewest words, the superiority of this SIGNAL Switch is due to the fact that it has the good features found in highest priced amateur change-over switches, plus all the qualifications of the modern antennae switch. Lack of room prevents recounting these features here; one point alone should suffice, however, as an ex-



Transmitting Side

ample: That is the arrangement whereby the aerial is drained of any accumulated charge before the switch reaches receiving position. Search and you'll find this feature only in the most



expensively built commercial aerial switches. And any operator who is "wise" to the nasty kick in telephone receivers, when shifting quickly from send to receive, will appreciate this SIGNAL advantage.

Write for the SIGNAL literature now—it is free. Address

Signal Electric Manufacturing Company

MENOMINEE, MICHIGAN.

THE SIGNAL "V. T." SOCKET

The only vacuum tube socket on the market today that will take any of the standard four-prong tubes, either Detector, Amplifier or Oscillator, without changing or adjusting. And this is not the only distinguishing mark of this SIGNAL socket—the others are all told



in the latest SIGNAL Bulletin of High Class Wireless Apparatus, which is yours for the asking.

HERE!

A New Radio Store
in Oakland

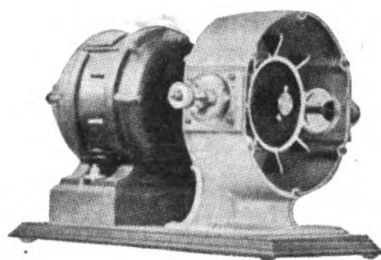


Just opened for business, this Radio Supply Store in the heart of Oakland, is ready to fill all of your requirements in the radio line. Drop in and get acquainted. We have everything from switch points to generators. Complete stock of all standard receiving and transmitting apparatus.

Evans & Sabo

Successors to Western Wireless
Works
DEALERS—MANUFACTURERS
AGENTS

1972 San Pablo Avenue
Oakland, Calif.



Benwood Rotary Quenched Spark Gap

The finest synchronous gap made
A REAL GAP AT A REAL PRICE

The outstanding features are:
A Removable & Renewable Point Rotor
Green Pyrex Glass Insulators
Silent in Operation
Visible Spark

Furnished with machined aluminum coupling that makes slippage impossible and at the same time makes the adjustment for synchronism a simple affair. Complete, as shown, on hardwood base with finest 1800 RPM motor available:

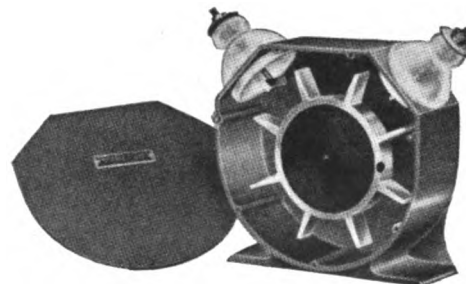
\$65.00 aluminum housing \$60.00 Bakelite Housing
MOTORS SEPARATE (SYNCHRONOUS), 1800 RPM 1/4th H. P. (Prepaid) \$30.00
ALUMINUM GAP SEPARATE, with glass insulation and type "R" disc.. 25.00

The Benwood 'Super' Gap

Complete as shown with
Green glass insulators
Removable point disc (machine
stamped)
Bakelite insulation

ANY NOTE
INCREASED RADIATION
VISIBLE SPARK

New Low Price, \$22.00



Send for our new fall and winter "BENWOOD BULLETIN" and note our prices

The Benwood Company, Inc.

1300 Olive Street, St. Louis, Mo.

NEW MOTORS FOR ALL PURPOSES
STANDARD MANUFACTURERS
PROMPT DELIVERY
ALL SIZES UP TO 5 H.P.
We Specialize In Small Motors & Generators
ALL PHASES AND FREQUENCIES IN STOCK AT ALL TIMES
Largest exclusive Mail Order Small Motordealers in the world.
CHAS. H. JOHNSTON, Box 38, West End, Pittsburgh, Pa.

WIRELESS, TELEPHONE GENERATORS
500 VOLT - 100 WATT - 3400 R.P.M.
FOR MOUNTING MOTOR GENERATOR SETS.

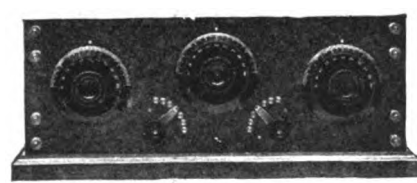
\$28.50 EACH
WRITE FOR CATALOG



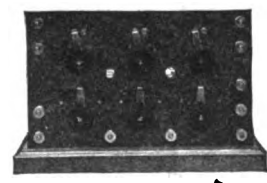
"B" BATTERIES
AN
EVEREADY
PRODUCT

43V. Batteries, tapped.....\$5.00
22½ V. Batteries, Navy Type..... 3.50
22½ V. Batteries, Commercial
Type 2.50
Latter two types especially adapted to
Cunningham and Radiotron Tubes.
Postage Prepaid Anywhere in U. S.

ETS-HOKIN & GALVAN
Wireless Engineers
10 Mission Street San Francisco



Unwired Regenerator \$22.50



**Detector
& 2 Stage
Amplifier
\$25.00**

**With Three Tubes Matched to
Transformers\$40.00**

These apparatus are constructed with the best materials and workmanship. They have no superior at any price. Apparatus fully guaranteed. Send for descriptive bulletin immediately.

FREDERICK WINKLER, Jr.
304 Columbus Ave., New York, N. Y.

Assemble Your Own Apparatus

We are now manufacturing Radio Apparatus of improved designs, and furnish stock parts for those who desire to build their own cabinets. These prices can not be beat.

COMPARE THESE PRICES

Triple Honeycomb Mounting (for panel mounting)\$5.00
Variometer wood parts (unassembled and unmounted)..... 2.00
Miniature D. P. D. T. panel Switch. 1.00
Vario-coupler Rotor80
"Paragon" equipment is not merely assembled - - - but BUILT."

Send 10 cents for Bulletin and future announcements.

PARAGON ELECTRIC CO.,
215 North 6th Street, H.
Newark, New Jersey

You Should Be a Subscriber

LETTERS TO THE EDITOR (Continued from Page 248)

600 meter watch is thereby kept. This is also regular navy practice.

As far as interviewing the skipper about the installation, this is the proper thing to do if it does not comply with the law. But if the skipper has been used to results obtained by operators using audions and you fail to produce the same, his answer when broached regarding purchase of additional equipment is invariably, "It has worked all right before, I don't see why it doesn't do the same now," and no amount of argument can convince him otherwise. Rather than be thought an incompetent operator, most radio men provide their own audions or other efficient equipment.

There is no reason to bore the table or bulkheads full of holes, or litter the shack with a jumble of loose connections, switches or other material, as Mr. Soderstorm states. Any operator who does this is incompetent to operate the set and may wreck some vital part of it, and has no place in radio. An audion or other proven efficient reception apparatus can be installed in cabins to be an asset to the appearance rather than detrimental, and "hay wire" is unnecessary. No, Mr. Soderstorm, we have never seen a chief engineer bring a feed pump aboard a steamer, but we have seen him and his associates bring aboard their own tools and other small portable conveniences not provided by some steamship companies. Moreover, we have noticed that it is a custom for all mates to bring their \$60 to \$100 sextants, and in a good many cases, glasses, aboard, because they were unprovided in the majority of ships, and which are of vital necessity in navigation. The radio man is establishing no precedent by bringing along a few conveniences for reception, any more than if he happens to bring along a typewriter of his own, as long as he does not bring aboard some integral part of the equipment—as a motor generator or transformer—to supersede the company equipment.

The right operator is not referred to sarcastically by the ship's officers, as Mr. Soderstorm insinuates. He holds his place on his merits as a man, and is respected as such in accordance.

As far as we know there is no law against the use of audions as long as emergency storage batteries are not used for the operation of same. Radio inspectors in ports of the United States have entertained no objection to such use. We cannot see where patent rights have anything to do with Standard Oil or other ships controlled by the Radio Corporation which own and control the rights for the use of audions.

Moreover, the audion receiver or detector affords the certainty of an efficient
(Continued on Page 252)

Say Radio to the Advertiser, it will help you.



—THE—

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



**CORWIN'S
Improved SWITCH**

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right into the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3-4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life." Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G8, 4 West Park St.,
NEWARK, N. J.

WIRELESS RECEIVERS

High Resistance

SUPER - SENSITIVE
Superphone
TELEPHONE DEVICES

MAGNIFYING APPARATUS

A Set of Receivers Offering a Combination of a Silent and loud reproduction of Wireless Signals.

Efficiency of the Superphone Receivers

Sound is transmitted from one medium to another in vibrating waves. These waves travel in every direction unless they are forced into one particular direction. Attached to the second cap, close to the diaphragm is a small round tube, this tube is made so that it fits snugly into the operator's ears. The sound waves are now forced into one direction—the operator's ears. This attachment makes the loss of sound impossible, giving the maximum reproduction. The feature that aids the clear reproduction is the resonant chamber directly below the diaphragm and above the magnet and coils.

THIS CUT ILLUSTRATES THE RECEIVERS WITH HORN ATTACHED

The high tension metal used as a spring forces the receivers close to the ears. The receivers are so attached to the head band that they rest against the ears in a vertical position. This makes it comfortable for the operator.



Patent Pending

Superiority of the Superphone Receivers

The features that are enjoyed by only the Superphone receivers, that of the Loud Talking Horn attachment and the attachment that fits into the operator's ears, make them superior to any set of receivers on the market at present. The construction and arrangement, not to say anything of the matched tones of the two receivers, place them far above the ordinary receivers.

Superphone Receiving Set with Cord and Headband

2000 ohms	\$12.00
3000 ohms	15.00
4000 ohms	20.00
With Horn Attachments as above, extra	5.00

High Resistance Loud Talking Horn Apparatus for Use on Wireless Instruments Direct



Model No. 50,
12 In. Long
Price \$12.00

Low Resistance

SUPER - SENSITIVE
Detectagraph
MICROPHONE DEVICES

Practical Instruments for Commercial and Scientific Purposes
Amplify Your Radio Signals.

With the new Detectagraph-Transmitter, the amateur can amplify radio signals to such an intensity that he can hear the signals about his station without the need of the telephone head set.

The manner in which the amplifying process is attained is by attaching with tape the Detectagraph-Transmitter to the regular wireless receiver.

By the addition of a loud talking telephone he is able to hear the messages many feet away from the instrument.

The super-sensitive Detectagraph-Transmitter herewith shown is two and three-eighths inches in diameter, five-eighths of an inch thick and weighs less than three ounces. It is the most sensitive sound-detecting device ever brought before the public.

Not only is this instrument applicable for amplifying radio signals, but it can be used with equal satisfaction for amplifying other sounds. Phonograph music can be transmitted from one place to another by means of this instrument, and those who are afflicted with deafness will find enormous benefit by using this transmitter.

Can be used for any purpose where a sensitive detecting instrument is required.

Our Special Loud Talking Telephone Transmitter No. 5, Price \$12.00

This model is especially made for Loud Talking Telephone reproduction. This transmitter can be used to advantage in connection with our loud Talking Receivers or Horn Apparatus by wireless operators, window demonstrators, and in fact by every one desiring to build up their own loud talking telephone apparatus.



Detectagraph \$18.00

This detecting instrument of marvelous sensitivity can be used for detecting secret conversations. Outfit consists of Sensitive Transmitter, 25-ft. Black Cord, Receiver, Headband, Case and Battery.

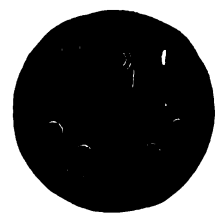


Our Super-Sensitive Detectagraph Transmitter No. 2 Price, \$8.00 Complete



Adjusted Model No. 60 Horn, High Grade Loud Talking Receiver, Cord Plugs and Desk Stand Base. Price, \$15 Complete

Our New Special Loud Talking Receiver No. 25 Price \$7.50



Detectagraph Rheostat, especially made for amplifying circuits. Price, \$2.00 Complete.

Equal to any \$35 instrument made. Outfit consists of Super - Sensitive Transmitter with cord connector; Super - Sensitive Ear Piece with small black cord; Black Single Headband; Black Case and Two Batteries.



The Detectagraph Junior Deaf-phone, \$18.00

Order direct from ad. Or write for free descriptive new catalogue

G. BOISSONAUT COMPANY

25 DEY STREET
Factory: Whitestone, L. I.

(Incorporated) NEW YORK CITY
Makers of Super-Sensitive Hearing and Talking Devices

Know the
TRUTH

Type JT
Thermo-Junction
Radiation
Ammeter



Use a
0-1½, 0-3
0-5, 0-10
Amp.
Ranges

\$12 POST PAID

Generous size—3¼ in. diam. Extremely accurate and rugged movement. Jewelled bearings. Supersensitive Thermo-Couple. No zero adjustment necessary.

Double the life of your UV 202 by using our now famous **Type JX 0-15 A. C. Voltmeter**. Jewelled bearings. Magnetic vane movement. Matches the **TYPE JT** 3¼-in. diam.

(Also available) (in 0-10 Amperes),
\$8.00 Postpaid.

Somerville Radio Laboratory
New Address 178 Washington Street
BOSTON, MASS.

General Machine Works
Mechanical or Electrical General
Manufacturing, Experimental Work,
Telephone and Wireless Parts
Manufactured, Tools, Fixtures, Dies,
Jigs, Etc., Stamping.

Engineering Dept. of
G. Boissonnault Co., Inc.
26 Cortlandt Street, New York
Factory
WHITESTONE, L. I.

**The Biggest Radio Offer
You Ever Heard Of!**

By special mutual arrangement between the publishers, the three big radio magazines of the country are made available for a limited time at a special rate when ordered together—

"Pacific Radio News,"
pioneer journal of Western
Radio Development;

"Q S T," devoted wholly
to amateur communication,
and the official organ of the
A. R. R. L.;

"Radio News," the newest
and best illustrated radio
periodical in the world.

Don't miss this opportunity to secure the best contemporary radio literature of America coming to your door every month for a year—at a saving in real money, too. Send in your subscription today!

**Pacific Radio
Publishing Co., Inc.**
465 Pac. Bldg., San Francisco, Cal.

All for
For
One Year

\$5.00

LETTERS TO THE EDITOR
(Continued from Page 250)

watch, with no chance, as in the case of a crystal, of it going dead each time you send, or of having to fuss around for a good point.

Mr. Soderstorm apparently assumes that all operators who use audions and other equipment of proven value, are fools or worse, or dismantle their sets and imperil the safety of all ships by the installation of unreliable apparatus. He has only to visit a number of ships in charge of competent operators to note that such apparatus is, in the majority of cases, as efficiently and neatly installed as that provided by the company.

Respectfully,
S.S. "Admiral Schley" H. MacGOWAN,
Oct. 9, 1921. At Sea. N. H. ALLEN.

Radio Amateurs of COLORADO, UTAH, NEBRASKA and WYOMING, do you know

DENVER—

Has the Largest Wireless Supply Store in the Middle West—Everything in Radio Supplies.

We Are Distributors of
REMLER, COLIN B. KENNEDY CO.,
DeFOREST RADIO and
W. J. MURDOCK
Equipment and Parts.

We Make Immediate Delivery
Start with the "interpanel" system and thus avoid discarding apparatus
Write for our Bulletins and Price List. We will give prompt Mail Order Service by Parcel Post or Express, as requested.

Our "REYNRAD" Short-wave Coils are best on the market, \$8 each.

REYNOLDS RADIO CO., Inc.
613 19th St. DENVER, COL.

**500 Volt Generators
\$35.00**

125 Watts, ball bearing 42 segments in commutator, shunt wound, our own make.

**IF YOU DO YOUR OWN
WINDING**

We supply parts complete excepting wire, for \$12.00.

¼ H. P. 1800 R. P. M. 60 cycle 110 V. Motors, \$18.40 each.

STORAGE BATTERIES; heavy duty 60 ampere hour, large plates; can be used for automobiles, \$21.00 each.

All of the above F. O. B. Canton, O.

**The Electric Motor
& Engineering Co.**
CANTON, OHIO



*A
Desirable
Xmas
Gift*

Christmas is a good time to improve your radio station. What more desirable addition could you wish for than a

FEDERAL
Loud Speaking Pleiophone

No station is really complete without it.

This is a high grade instrument in every way. Built with the same degree of care and accuracy that marks all Federal products. For use in connection with one or more stages of amplification.

Write for Bulletin No. 103 WB, Describing Federal Radio Apparatus.

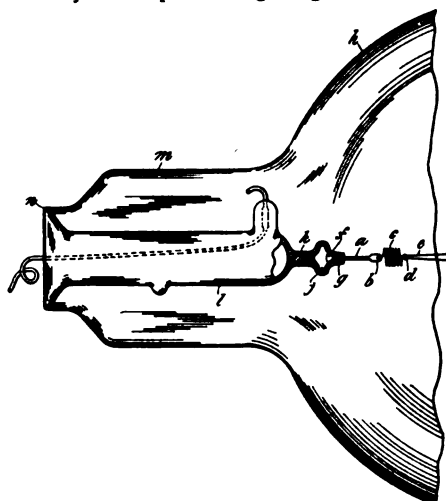
Federal Telephone & Telegraph Co.
BUFFALO, N. Y.

RECENT RADIO PATENTS

(Continued from Page 204)

C. H. Harvey, No. 1,389,351—August 30, 1921.—Means for Supporting Electrodes in Ionic Tubes.

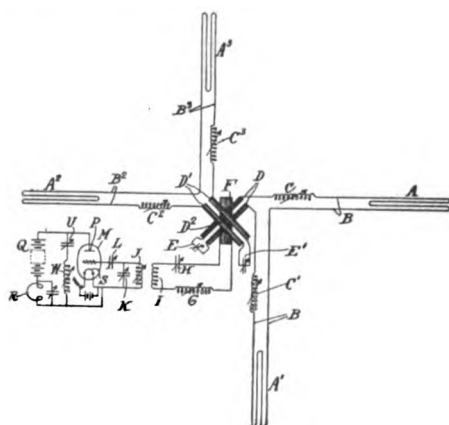
A construction for the support of the heated cathode e is described, which has the object of permitting large variations



in temperature without danger of cracking the glass. This is effected by molding the anchor wire a loosely in the recess j instead of fusing it into the glass as done heretofore. The usual spring c is interposed between the anchor a and the filament e.

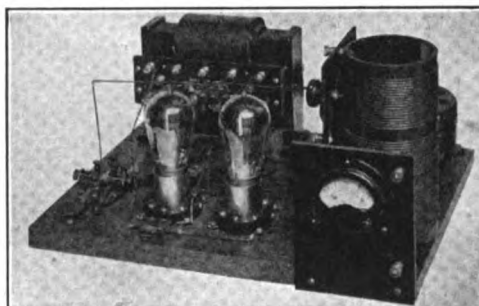
R. A. Weagant, No. 1,389,800—September 6, 1921.—Radiosignaling Apparatus.

A static eliminating means is described for a receiving station. For this purpose, a number of antennae A, A1, A2, and A3 are arranged angularly with respect to each other, adjacent pairs as A and A1 being connected to coil D in a tuned-closed circuit. Other pairs of antenna



may be connected to coils in a similar manner, as D'. These coils are angularly displaced and are all in inductive relation to a rotatable coil F connected to a conventional receiver circuit. It is stated that by properly positioning the coil F, the effects of static may be neutralized, since the phase of the static is made to differ substantially in the two coils D and D'.

An Amateur C. W. Set That You Can Easily Assemble Yourself



Connects directly to 110 volt A.C. lighting circuit — Approximate Range 400-500 Miles —Conservative Range 250 miles.

The approaching Radio season will well show a decided increase in C. W. transmission.

The remarkable ranges which may be obtained by even the most simple C. W. transmitter have changed the entire amateur outlook. Previous to the event of C. W. transmission a range of 50 to 100 miles was average work. Today an amateur—skilled or unskilled—can assemble a simple C. W. trans-

mitter which will surpass his expectations. The illustration above shows a simple C. W. set, the parts of which are attached to a baseboard. Anyone can assemble this outfit and wire it up. We have selected the necessary units for assembly, as follows:

Parts for Amateur C. W. Outfit

1 "Acme" 200 watt power transformer.....	\$20.00
2 Radiotron UV 202 5 watt transmitting tubes.....	16.00
2 "General Radio" tube sockets.....	3.00
1 "National" Rheostat, 3 ohms, 6.5A.....	5.00
1 "Tuska" 3-circuit inductance.....	12.50
1 Grid Leak, 10,000 ohms.....	1.25
3 condensers.....	3.00
1 C. W. Key.....	3.00
1 Radiation meter 0-2.5A, T. A. W.....	5.00
1 B. D. Panel for meter (with pole and binding post)....	1.50
1 Wood base(stained).....	1.50
Complete parts, packed, ready for shipment.....	\$72.25

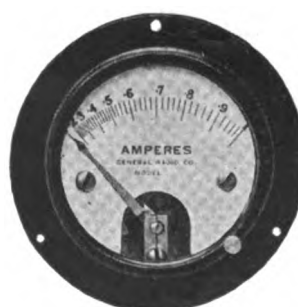
ATLANTIC RADIO CO., Inc.

727 Boylston Street
Boston, Mass.

We have a liberal supply of the Radio Corporation's new Instruction Book on C. W. Operation, and will gladly send you a copy direct, at once, on receipt of 25 cents.

Branch, 15 Temple St.
Portland, Me.

Adjusting a C-W Transmitter



Results with a CW set are not obtained by sending: "CQ—How are my sigs OM?" The circuits from input to output must be adjusted by ammeters.

The hot wire ammeter is the universal meter for this service. It is adapted for d.c., low frequency a.c., or radio frequency. It can be checked at any time on d.c. and will be equally accurate on radio frequency. As its action depends on the fundamental I²R law, it always measures actual effective amperes.

Our Type 127-3" Hot Wire Ammeter was made for exactly this service. It is made in front-of-board and in flush models, as illustrated and in a variety of ranges.

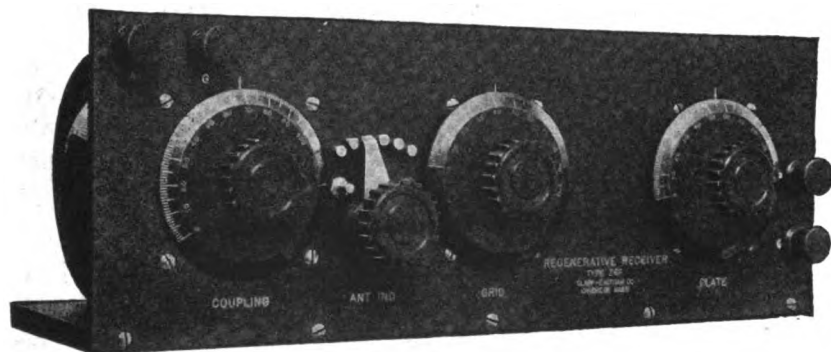
PRICE \$7.75. Send for Free Bulletin 900C

GENERAL RADIO CO.

Standardize on General Radio Equipment Throughout CAMBRIDGE 39, MASS.

Say Radio to the Advertiser, it will help you.

QUALITY **CE** SERVICE



\$38.00 REGENERATIVE RECEIVER
Type Z. R. F. 175-600 Meters

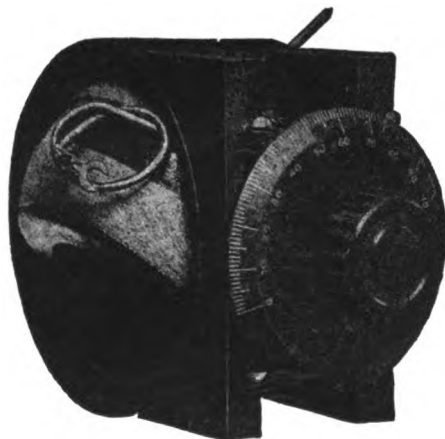
"Licensed Under Armstrong U. S. Patent No. 1, 113, 149."

An A-1 set in every respect of design, material, and workmanship for only \$38.00. Will give remarkable results in long distance short wave work. In-

ductance values have been very carefully worked out and a special effort made to reduce losses to a minimum, making this an extremely efficient set.

Type Z. R. V. \$6.50
VARIOMETER

Unit construction insures permanent positive regulation of inductance from 1.25 millihenry to .1 millihenry—an unusually wide range for instruments of this type—and completely prevents trouble from misalignment of bearings. Brush contacts enable the rotating element to be continuously turned without breaking connections. Price, furnished with knob and dial, \$6.50. Without knob or dial, \$5.75. Send 6 cents in stamps for complete Radio Catalog.



CLAPP-EASTHAM COMPANY

RADIO ENGINEERS and MANUFACTURERS

140 Main Street, Cambridge, Mass.

California Representative: LEO J. MEYERBERG CO.
San Francisco and Los Angeles

THE MODULATOR

Published by Members of the
RADIO ASSOCIATION OF GREATER NEW YORK
"Written for Amateurs by Amateurs"

THE MODULATOR is the only magazine devoted exclusively to C. W. Real practical "How to Make" articles, written by men who know.

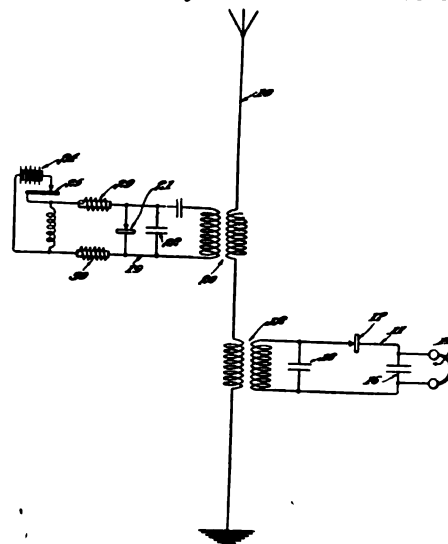
Subscribe now at \$1.00, per year as the rate will soon be raised to \$1.50. Help your brother amateur put it over.

THE MODULATOR PUBLISHING COMPANY

179 Greenwich St., New York City.

V. Bush, No. 1,389,026—August 30, 1921.—Radio Receiving System.

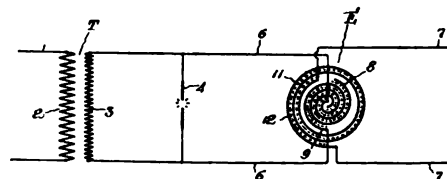
A scheme is described for breaking up the radio frequency oscillations received into groups at audio frequency. This is accomplished by an absorbing circuit coupled to the antenna at 20, so arranged that it is periodically capable of absorbing a large portion of the received energy, so that the amount transmitted to the telephone circuit is insufficient to operate it. The absorbing circuit is rendered alternately active and inactive at



audio frequency by periodically short-circuiting the condenser 22 of this circuit by the crystal detector 21. To cause the crystal detector to be alternately conducting and non-conducting, an a.c. voltage of audio frequency generated by the interrupter 24, 25 is applied to it. Since the a.c. current can flow only in one direction through the detector 21, the periods of activity of the absorbing circuit occur at the frequency of the alternating current source which is that within the range of audibility.

L. R. McDonald, No. 1,389,255—August 30, 1921.—High Frequency Electrical Oscillation Apparatus.

An oscillation circuit is described in which a single piece of apparatus E serves both as a transformer and as a condenser. This apparatus is inserted between the source 3, 4 and the work circuit 7, 7, and consists of coiled conductors, 8, 9,

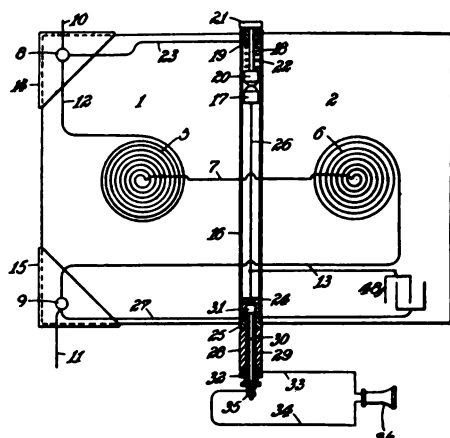


and 11 separated by insulation. The inner conductors 8 and 9 are not in metallic connection, but serve merely as plates of a condenser. The outer conductor 11 serves as the secondary to which this work circuit is connected. The electrostatic lines of force in apparatus E are perpendicular to the electro-magnetic

lines of force, and it is claimed that much better regulation of very high frequencies can be obtained by this apparatus than those hitherto used.

H. St. J. de Aula Donisthorpe, No. 1,388,936—Aug. 30, 1921.—Radio Telegraphic and Telephonic Apparatus.

A pocket receiving set is described, which is adapted to be connected to aerial and earth at 8 and 9. It consists of a pair of hinged members 1 and 2 which may be opened and closed like the leaves



of a book. Each member carries the coil 5 or 6, and by varying the book opening, the receiver set may be tuned to the desired wave length. The hinge accommodates the detector elements 17, 20, as well as the plug for the telephone 36.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Radio (formerly Pacific Radio News) published monthly at San Francisco, Calif. for October 1, 1921.

State of California, City and County of San Francisco, ss:

Before me, a notary public in and for the state and county aforesaid, personally appeared A. H. Halloran, who, having been duly sworn according to law, deposes and says that he is the editor of Radio and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Pacific Radio Publishing Co., 465 Pacific Bldg., San Francisco, Calif.

Editor, A. H. Halloran, 465 Pacific Bldg., San Francisco, Calif.

Managing Editor, A. H. Halloran, 151 Minna St., San Francisco, Calif.

Business Manager, H. W. Dickow, 151 Minna St., San Francisco, Calif.

2. That the owners are: Pacific Radio Publishing Co., 151 Minna St., San Francisco, Calif.; H. W. Dickow, 151 Minna St., San Francisco, Calif.; A. H. Halloran, 151 Minna St., San Francisco, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are: None.

A. H. HALLORAN.

Sworn to and subscribed before me this 27th day of September, 1921.

CHAS. EDELMAN.

(My commission expires April 17, 1922.)

Fully Assembled Instruments

Wired and Unwired

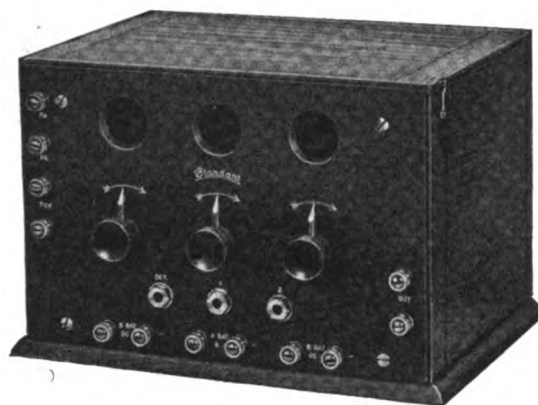
Your choice of two types, Commercial or Amateur. The commercial type is assembled from parts heretofore considered too costly for amateur work. The R A D I O Corporation's new UV-712 transformers are but one feature indicating the quality used throughout.

The amateur type is an exact duplicate, except that transformers and tube receptacles of high efficiency, but lower cost are used.

PRICES, F. O. B.

NEW YORK

Commercial type, wired	\$65.00
Commercial type, unwired	55.00
Amateur type, wired	57.00
Amateur type, unwired	47.00



Detector and Two Step Amplifier

Wire Your Own—Save \$10.00

The "Standard" Plan brings you assembled instruments of commercial grade in appearance and results, at little more than the cost of separate parts.

There are two items in building finished radio instruments, the actual assembly, and mounting, and wiring. The assembly is machine work. It cannot be duplicated without the necessary machinery and equipment. But because it is machine work, it is really the less expensive part of the entire operation.

Wiring is hand work, and you can do it as well as it can be done at the factory. Besides, you probably have your own ideas in wiring, which you would prefer to experiment with.

By using Standard unwired instruments, you get the combination of machine work where it is

necessary, and you save money by doing the wiring yourself. Only in this way can you get the superior appearance and performance of correctly assembled instruments at prices only slightly above what the unassembled parts would cost you.

The Detector and 2-Step Amplifier shown above, or any other Standard instrument, will be shipped to any part of the U. S. on receipt of one-third the purchase price. Examine the instrument, and if you are not fully satisfied that it represents the best value for your money, return it at once, and we will refund your money, after deducting carrying charges. But we feel confident that you will be delighted with your purchase, and you will be glad to remit the balance and keep the instrument.

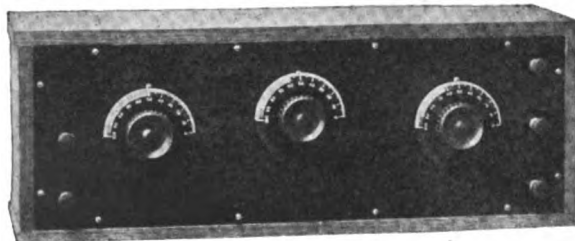
For those who desire to save on the cost of assembly "Standard" Instruments are also offered knocked-down, consisting of engraved drilled Formica Panels, Nickeled Support Rods, Rheostats, Sockets, Condensers, and like units, sufficient Nickeled Bus Wire, Screws, Nuts, etc., together with Wiring Diagram.

Complete parts for Commercial Type Det. and 2-stage Ampf...\$42.00
Complete parts for Amateur Type Det. and 2-stage Ampf..... 35.00

Order direct from this ad, or send stamp for literature describing the complete line of Standard Instruments.

Standard Assembling Co.

19 Bridge Street, Dept. A, New York



It will Pay You Well to read this Carefully!

1. This Short Wave Regenerative Receiver is correctly constructed and is equal to others at double the price. Formica insulation used exclusively. Ball variometers; rotors turned from hard maple; stators from Formica.

2. Chelsea dials now used. Cabinet is solidly constructed of oak. Workmanship cannot be questioned.

3. We send you a receiver on receipt of \$10. Balance, C.O.D.

4. Price only \$30 complete. Order from this ad for quick results.

Free Circular gives additional information. Dealers, send for proposition. Here is a Christmas Present for that Radio Bug!

THE RADIOMART CO., 1236 American Ave., Long Beach, Calif.

Say Radio to the Advertiser, it will help you.

You Should See
**RADIO
TOPICS**

In its new Rotograde form

It is the most attractive and interesting Radio Magazine that you have ever seen.

The November number is published in this new modern Artgrave style.

Send 15 cents for a Sample Copy

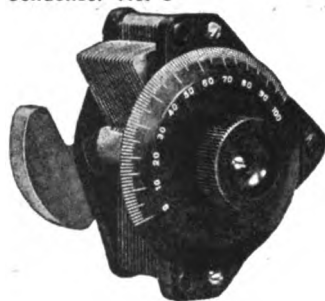


RADIO TOPICS

4533 N. Sawyer Ave., Chicago, Ill.

CHELSEA Variable Condensers

Condenser No. 3



(Die-Cast Type)

No.	Capacity	Type	Size	Lbs.	Price
2	.0011 m. f.	Mounted	4 1/2 x 4 1/2 x 3 1/4	1 1/4	\$5.00
2	.0006 m. f.	Mounted	4 1/2 x 4 1/2 x 2 1/4	1 1/4	4.50
3	.0011 m. f.	With Dial	4 1/2 x 3 x 4	2	4.75
3	.0011 m. f.	Without Dial	4 1/2 x 3 x 4	2	4.35
4	.0006 m. f.	With Dial	4 1/2 x 2 x 3 1/4	1 1/4	4.25
4	.0006 m. f.	Without Dial	4 1/2 x 2 x 3 1/4	1 1/4	3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates. Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY
13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

Do You Need a Vacuum Tube?

We will send you one free of charge if you secure 3 yearly subscriptions to "RADIO." You can have your choice of any standard receiving tube. Send \$6.00, the 3 subscriptions, and 25 cents for mailing the tube.

RADIO, 465 Pacific Building, San Francisco, Calif.

Classified Advertisements

Advertisements in this section are three cents per word net. Remittances, in form of currency, money order or stamps, must accompany order.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bld., San Francisco, Calif.

STOP! LOOK! AND ACT! V. T.'s. With each Radiotron UV200 V. T. detector or A-P Moorhead V. T. detector or Radiotron U. V. 201 V. T. Amp. or A-P Moorhead V. T. amp., we will supply free of charge your choice of either a Murdock V. T. socket, improved contact type, or a Remler Bakelite smooth running rheostat, latest type. Radiotron UV200, \$5. Radiotron Amp. V. T. UV 201, \$6.50; Moorhead A-P detector, \$5.00; Moorhead A-P Amp. V. T., \$6.50; Remler Bakelite rheostat, latest type, \$1.00; Murdock V. T. socket, \$1.00. We absolutely guarantee the foregoing apparatus. Only new and high-grade equipment carried in stock. All orders are filled within twelve hours and shipped postpaid and insured, thereby saving time and money. Remember us. The Kehler Radio Laboratories, Dept. P, Abilene, Kansas.

DON'T READ THIS! Detector and two-stage \$40; Spider Webs 180-450, \$4.50; large 180-1000, \$14; Remler Control Panel, \$7; Panel Mounting Variable Condenser \$3 plate, \$4.50; Murdock fones, 3000 ohms, \$4.75; Duck's Navy Coupler, \$17.50. Everything for \$85. All articles P.P. Insured. W. C. AICHILL, 844 Central Ave., Hollister, Calif.

TO THE READERS OF RADIO. Do you know that you can save considerable of your money by buying your audion control panels from us? Our controls are very small and compact. Our Det. and one-step is six by nine inches, front space, and our Det. and two-step six by nine front. Watch this magazine for our future advertisements. DEVORE RADIO SUPPLY CO., Gibson City, Illinois.

NEW AND ORIGINAL—The KLAUS switch lever is all of that. The knob and nickel plated blade are all of the switch that moves, allowing you to solder connection directly to shaft of switch. Absolutely no possibility of switch loosening. Silent and sure. Klaus switch, 60c, 2 for \$1.10. As a special offer, our switch with 6 switch points, 65c. **PORT ARTHUR RADIO LAB., Port Arthur, Texas.**

SHORT WAVE REGENERATIVE SET gets results, \$20; DeForest Honeycomb panel, mounting 3 coils, 2 L25, 1 L35, \$8; Loose coupler (crackerjack), \$5; Tresco C. S. tuner, \$8; Krag rifle .30 (U.S.) first class, leather sling, 120 rds. ammunition, \$20. Write quick for particulars. **JOHN A. KINDLE, Monroe, Wash.**

AT LAST—A real vt. socket. Fused, no danger of burning out that expensive tube; take your choice of 5w. tube socket or receiving tube socket, contact over whole surface of prong on tube base, precluding the possibility of noisy connections; super-efficient for CW. The unusual Victor socket, \$1. **PORT ARTHUR RADIO LAB., Port Arthur, Texas.**

BKUMA YRLSBUG. 240 beginners tell how memorize wireless code in half hour to two hours. 28-page booklet and 10 supplementary pages mailed for 10 red stamps. **DODGE, Box 220, Mamaroneck, New York.**

WE CALIBRATE wavemeters up to 1000m for 35c per point, 3 points \$1. **PORT ARTHUR RADIO LAB., Port Arthur, Tex.**

FOR SALE—Complete sending set. Price cut to less than half. 6APH station. Perfect condition. One .01 dubiller condenser, \$20; one 1-8 h.p. induction motor 3600 r.p.m., \$15; 1 K.W. Acme transformer, \$12; O.T. 1-2 inch copper tubing, \$5 (key and switch thrown in); super benwood gap, 16 points (ENCLOSED) \$18. Total, \$70. (ALL EQUIPMENT ALMOST NEW.) Receiving Set—Detector panel in oak box 10x12, \$12; DeForest two-step, \$30; 6 coils and honeycomb stand, \$4; Baldy fones, type F, \$12.50; two condensers, \$6. Total, \$64.50 (tubes and "B" batteries thrown in.) 6-volt "A" battery and rectifier (Westinghouse), \$15. Would like to sell either outfit, or both, complete as would not care to sell separately for the reason that I haven't the time to devote to it. First come, first served. **RADIO STATION, 318 Valley St., San Francisco.**

GOOD APPARATUS FOR SALE CHEAP. 1 Jewell 0 to 1 ammeter, \$5; 1 Jewell 0 to 10 voltmeter, \$5; 1 variable potentiometer, \$1; 1 variable (semi) bridging cond., \$1; 2 DeForest L-500 honeycomb, \$1.10 each; 2 DeForest L-300 honeycomb, \$1.00 each; 2 DeForest L-200 honeycomb, \$1 each; 1 DeForest L-150 honeycomb, 70c. All coils have plugs attached. Have several other good bargains. Write me. **RADIO OPERATOR, 2630 Ridge Road, Berkeley, Calif.**

TELEGRAPHY

TELEGRAPHY—(Morse and Wireless) and Railway Accounting taught thoroughly; big salaries; great opportunities. Oldest, largest school. All expenses low—can earn large part. Catalogue free. **DODGE'S INSTITUTE, Hass St., Valparaiso, Indiana.**

Make Your Tubes "Burnout" Proof

This tiny fuse, slipped directly on filament terminals of any standard bulb, protects your tube against burning out.

RADECO SAFETY FUSE (Patent pending)

NOW, while your tube is in perfect condition, pin one dollar to this advertisement and be guarded against all future vacuum tube expense.

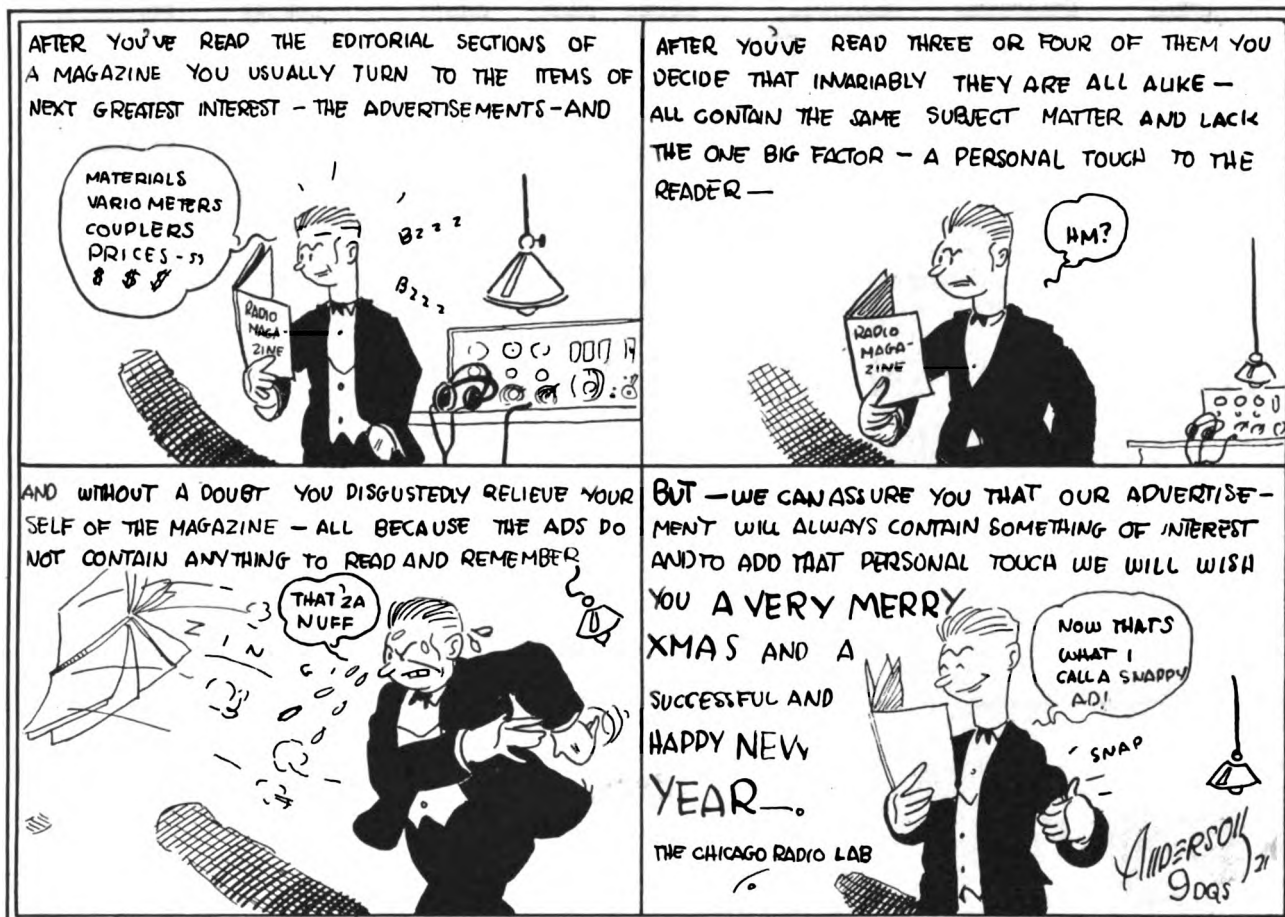
RADECO Safety Fuses come in 1/4, 1, 1 1/4, 2, 2 1/2 and 3 amp. sizes. Slip directly on filament terminals of any standard bulb. Used in any standard socket. **FOUR FOR \$1.00**

We carry complete stock of all radio apparatus. Order from any standard catalog.

MAIL ORDERS
Be sure and specify the size or sizes when ordering by mail.

Radio Equipment Co.

630 WASHINGTON STREET,
Boston, Mass.



What could be more desirable as an Xmas gift than an instrument that opens to its owner the gateway to a world of new, interesting and instructive experience.

The user of a Z-Nith Regenerator has the radio world at his will. Radiofone, C. W. and spark stations inaudible on ordinary equipment can be copied with ease on this new improved set, with *balanced vari-*



Z-Nith Regenerator

ometers, 180 to 1, 200 meter range 180 degree coupling, etc.

If your station already has a Z-Nith Regenerator, a Hyrad Rotary Gap, an Amplifon or one of the many other *individ-*

ual Z-Nith Products will form an equally satisfactory gift. We are making a special price reduction offer for Xmas. *Write us.*

Special Preparations Enable Us to Make Immediate Delivery

Chicago Radio Laboratory

6433 Ravenswood Avenue, Chicago, Illinois

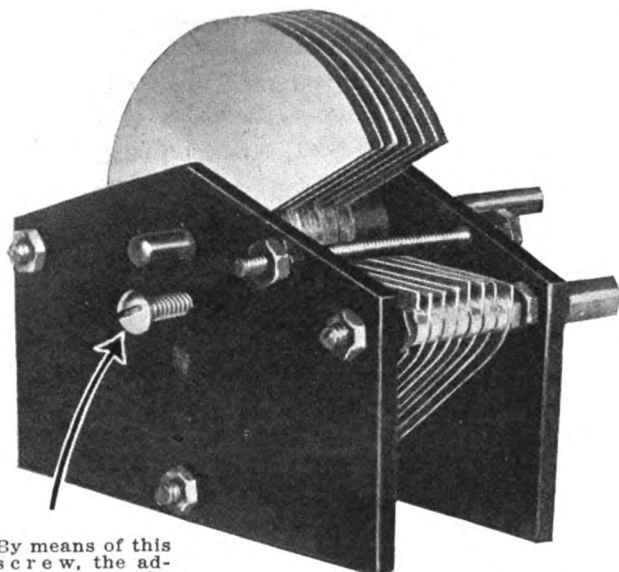
J. G. MATTHEWS, Pres.

K. E. HASSEL, Sec'y

SERVICE

Buy your apparatus where you get the service that should go with every piece of equipment you purchase. Buy your apparatus from The Radio Telephone Shop, which has equipment and machinery complete to give every purchaser, no matter where he may live, a full measure of personal service during the entire life of each piece of apparatus he buys.

THE NEW "PEN BRAND" VARIABLE CONDENSER



By means of this screw, the adjustment can be stiffened to prevent the variable plates from slipping after the desired wave length has been secured.

Postpaid to any address in the United States.
Dealers write for proposition.

An Improved Type

This is the new Radio Telephone Shop Series X Variable Condenser, manufactured with a special screw by means of which the adjustment may be tightened to prevent the variable plates slipping after the proper wave length has been secured. Connections can be made either by soldering or with nuts. The plates are die stamped from No. 22 Gauge hard-rolled aluminum, and the entire condenser is of typical "Pen Brand" quality and rugged construction throughout, particular attention being paid in the manufacture to making it sturdy and accurate, so as to give perfect service over a long period of time. Radio Telephone Shop service goes with every one sold, and each one is fully guaranteed. Sizes for every purpose.

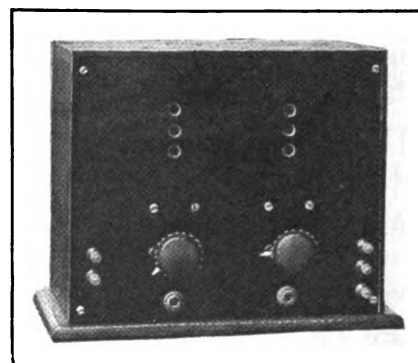
Price: 2 plate, \$2.00; 23 plate, \$3.60; 43 plate, \$5.25. With Pen Brand condensite dial 75c extra

Apparatus made to your order

WE MAKE DIES

The Radio Telephone Shop has recently installed special machinery and complete equipment to make manufacturing dies and handle die stamping work. Manufacturers will save time and money by procuring their dies here. Inventors—we can manufacture your apparatus. Write us for full particulars.

The special two-step amplifier illustrated at the right is a sample of some of the beautiful equipment the Radio Telephone Shop is manufacturing to the buyer's own specifications. If you want a set for some particular use, let us make it to order for you. If you can't buy what you want ready-made, have it made. Don't be satisfied with substitutes. We are completely equipped to make apparatus to order, from the smallest part to the most magnificent and most complete set. Tell us what you have in mind and let us submit a figure.



Of course we also have a complete line of standard equipment, and with every piece of equipment we sell goes the positive Radio Telephone Shop guarantee and the helpful Radio Telephone Shop service during the entire life of the apparatus. If you are not already one of our enthusiastic patrons, get wise. Try us. Get everything you are entitled to at the lowest price, and get it quick. Your regular needs, your special needs, and all your needs will be faithfully filled by—

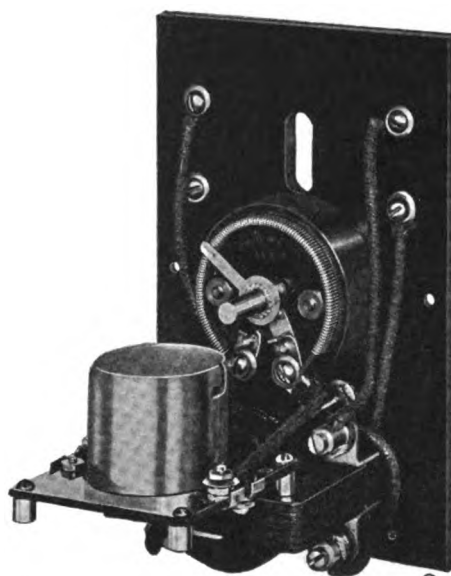
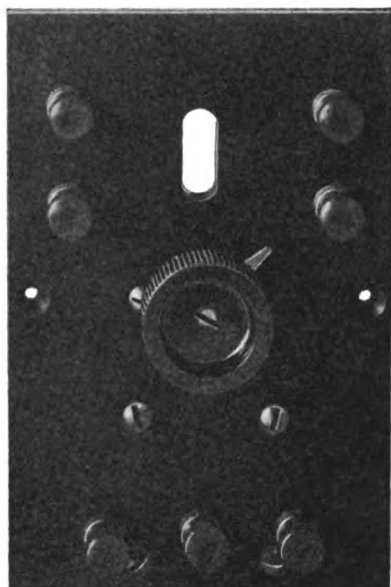
THE RADIO TELEPHONE SHOP

RADIO EQUIPMENT
Dealers—Designers—Manufacturers
175 Steuart Street, San Francisco, Calif.

A. F. PENDLETON,
Manager

BLISS

Unit Amplifiers and Panels



The most pleasing feature of this Amplifier is its compactness. All the instruments are mounted on the panel, and when mounted in a cabinet the panel is very easily removed, making all parts easily accessible at all times. The Transformers are General Radio make and are designed for the U. V. 202 Radiotron. Tube Sockets are standard, four-prong type. Panel is of well finished XX Bakelite and may be mounted on a base or in a cabinet with other units. Supplied without tubes or batteries. Wiring diagrams accompany each amplifier. **AN IDEAL AMPLIFIER.**

No. W-609 One stage Amplifier.....	\$15.00	No. W-612 Paragon Rheostat with Bliss Moulded Bakelite Knob	\$ 2.00
No. W-610 One stage Amplifier Panel.....	2.25	No. W-613 Insulated Binding Posts.....	.12
No. W-611 Tube Socket Mounted on back of Transformer	6.25	No. W-614 Complete set of Parts for W-609 Amplifier without wire and connections and not assembled.....	11.34



No. 301 BLISS Improved Switch, as illustration, Edgewise contact type with a genuine molded Bakelite Knob. 1 3-8 in. in diameter with a radius of 1 3-8 inches. Nickel plated lever.....\$.60

No. P-501 BLISS Moulded Bakelite Knob. 1 3-8 inches in diameter. POSTAGE PREPAID30

R. W. BLISS COMPANY

(Department P.)

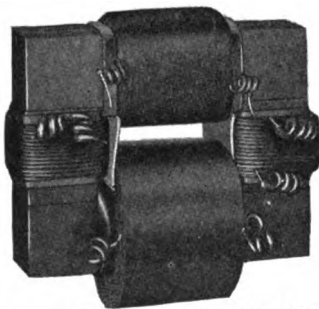
42 Davis Street

Wollaston, Mass.

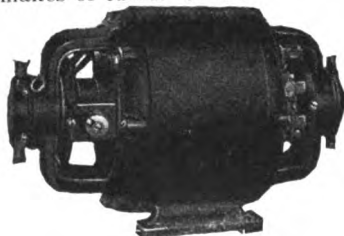
Guaranteed DeForest Parts for C. W. Apparatus Below Cost!



Inductances for transmitters up to 50 watt capacity. 50 turns of wire wound on threaded formica tube. 7 or 26 positive taps. Proper spacing between turns for maximum efficiency. \$8.50.



Acme C. W. power transformers. Unmounted. For 60 cycle, 110 volt supply. 3 secondary windings. 6, 12 and 1000 volts, with center tap on high voltage. Designed to furnish 500 volt D. C. when using standard rectifier tubes. Works efficiently with all makes of tubes. \$12.50.



Guaranteed ESCO dynamotors. 110 volt D. C. to 500 volts D. C. 100 watts. Ball bearing type; one unit. This is the best possible outfit for C. W. plate supply. Smooth running. Noiseless in operation. Large overload factor of safety. Reduced to \$65.00.

SPECIAL BARGAINS

Stromberg Carlson block Condensers, 1 mfd., $4\frac{1}{4}$ " long x $1\frac{1}{4}$ " wide, 1" thick @ \$1.40 each

Black Sheet XX Bakelite, cut to any size less than 24" x 24". In thickness $\frac{1}{8}$ "- $\frac{3}{4}$ " @ 10c per cubic inch

Brown Formica Panels $\frac{3}{4}$ " x $7\frac{1}{2}$ " x $7\frac{1}{2}$ " @ \$1.25 each

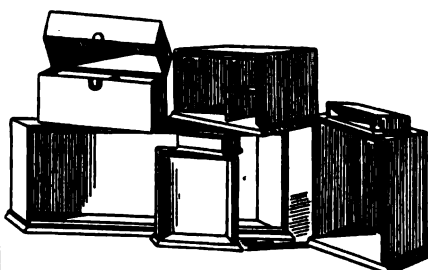
Brown Formica Panels, cut to any size less than 18" x 20". $\frac{1}{2}$ " $\frac{3}{4}$ " or 1" thick @ 9c per cubic inch



Guaranteed standard makes of head telephones below cost—
Murdock No. 55—3000 ohms.....\$4.50
Federal No. 53W—2200 ohms..... 7.00
Federal No. 52W—3000 ohms..... 9.50
Red Head —3000 ohms..... 7.50

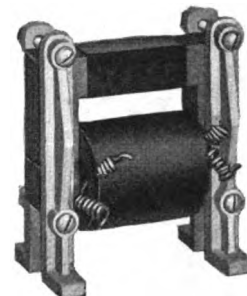
De Forest Cabinets

Hand rubbed, waxed early English finish. Quartered oak.



PANEL Width	SIZE Height	CABINET DEPTH	
$7\frac{1}{2}$ "	7"	8"	.....\$3.00
$9\frac{1}{2}$ "	7"	9"	..... 3.50
$7\frac{1}{2}$ "	$11\frac{1}{2}$ "	$6\frac{1}{2}$"	..... 3.00
$7\frac{1}{2}$ "	6"	2"	..... 1.25
$7\frac{1}{2}$ "	7"	$5\frac{1}{2}$"	..... 2.50
$18\frac{1}{2}$ "	$11\frac{1}{2}$ "	7"	..... 4.90
$11\frac{1}{2}$ "	$11\frac{1}{2}$ "	$6\frac{3}{4}$"	..... 4.25
$11\frac{1}{2}$ "	14"	$6\frac{1}{2}$"	..... 5.25
$8\frac{1}{2}$ "	1"	4"	..... 1.50
$13\frac{1}{2}$ "	7"	10"	..... 5.00
9"	9"	$6\frac{3}{4}$"	..... 6.75
8"	9"	$6\frac{1}{2}$"	..... 5.25
$10\frac{1}{2}$ "	9"	$6\frac{1}{2}$"	..... 5.00
15"	9"	$6\frac{1}{2}$"	..... 5.75
14"	9"	$6\frac{1}{2}$"	..... 4.00
$18\frac{1}{2}$ "	9"	$6\frac{1}{2}$"	..... 6.25
23"	9"	$6\frac{1}{2}$"	..... 7.50
$27\frac{1}{2}$ "	9"	$6\frac{1}{2}$"	..... 9.00
32"	9"	$6\frac{1}{2}$"	..... 10.00
$8\frac{1}{2}$ "	$17\frac{1}{2}$ "	$18\frac{1}{2}$"	..... 7.00
$9\frac{1}{2}$ "	7"	$4\frac{1}{4}$ "	
$11\frac{3}{4}$ "	8"	$4\frac{1}{4}$ "	with hinged cover.. 3.50
$4\frac{1}{2}$ "	$4\frac{1}{2}$ "	1"	with hinged cover.. 2.00
			..... .90

Catalogues describing DeForest apparatus as listed below will be sent upon request:
A Commercial Transmitting and Receiving Equipment.
E Receiving and Transmitting Equipment for Amateurs.
F Duo-Lateral Honeycomb Coils and Coil Mountings.
G Miscellaneous parts.



Acme AS modulation transformers on mounting brackets. Exceptionally efficient input transformer for Radio telephone work. \$5.00.



Guaranteed standard indicating instruments at manufacturer's cost—
Hot Wire Ammeters—General Radio—scale 0-7, \$7.00; Hot Wire Ammeters—General Radio—scale 0-2, \$7.00; High Frequency Ammeters—Roller Smith—scale 0-5, \$22.50; Filament Ammeters—Roller Smith—scale 1.5-0-1.5, \$8.00; W. Filament Ammeters—Weston—scale 6.0-0-1.5, \$9.00; D. C. Ammeters—Splitdorf—scale 0-2, \$5.75; D. C. Ammeters—Splitdorf—scale 0-3, \$5.75; D. C. Ammeters—Splitdorf—scale 0-5, \$5.75; Hot Wire Ammeters—General Radio—scale 0-10, \$7.00; D. C. Milliameters—Splitdorf—scale 0-150, \$5.75; D. C. Milliameters—General Radio—scale 0-250, \$7.00; Filament Ammeters—Amer. Ever-ready—scale 1.5-0-1.5, \$3.80.



Panel type microphone on japanned arm ready for mounting. Low resistance. No. 262W. \$4.00.

SPECIAL BARGAINS

Black best grade of hard rubber sheet, cut to any size less than 24" x 48", $\frac{1}{8}$ " or $\frac{1}{4}$ " thick @ 6 $\frac{1}{2}$ c per cubic inch

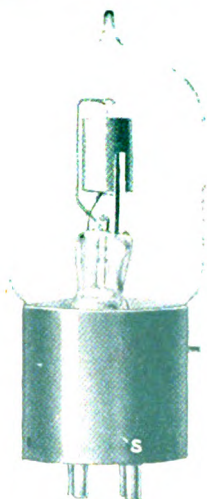
Tubing for coupling coils or small Helices:
Cellulac— $3\frac{1}{2}$ " O.D. x $\frac{1}{4}$ " wall @ \$1.80 per ft.
Bakelite— $3\frac{1}{2}$ " O.D. x $3\frac{1}{4}$ " I. D. @ \$1.80 per ft.
Bakelite— $2\frac{1}{2}$ " O.D. x $\frac{1}{4}$ " wall @ \$1.25 per ft.

De Forest Radio Telephone & Telegraph Company

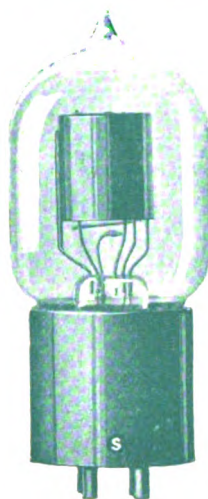
1391 Sedgwick Avenue, New York, N. Y.

ATLANTIC-PACIFIC RADIO SUPPLY CO., 638 Mission St., San Francisco, Cal., Pacific Coast Distributors.

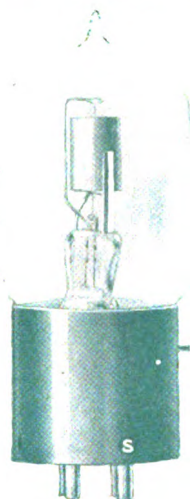
Use A-P Tubes for Efficiency



**THE A-P VT
AMPLIFIER
OSCILLATOR**
—the amplifier
used by the U. S.
Navy. "Use the Navy
uses." Price \$6.50.



**THE A-P
ELECTRON
RELAY**
—the most sensi-
tive detector of
spark signals
known to the
radio art. Price \$5.



**THE A-P
TRANSMITTER
TUBE**
—an efficient un-
damped wave
transmitter for
use in radio tele-
phony. Price \$7.50.

A-P Tubes are licensed by the Radio Corporation of America under the De Forest Audion, Fleming and patents for amateur and experimental use in Radio communication.

*New Magnavox Appa-
ratus Designed for Use
with A-P Tubes*

EXCLUSIVELY

Exhaustive tests by the Magnavox Company of Oakland, California, prove A-P Tubes so much more efficient than all other tubes on the market that the Magnavox Company have designed their new two and three-step Power Amplifiers for use with A-P Transmitter Tubes exclusively. These tests indicate A-P Tubes produce far better results because of the following superiorities:

1. Higher vacuum.
2. No adjustments necessary.
3. High amplification constant.
4. Low filament current.

For better results, for the best results, for sure results, use A-P Tubes exclusively. There is an A-P Tube for every use. Use A-P Tubes for efficiency.

—and DeForest Quality Equipment

New Low Prices

On DeForest Duolateral Honeycomb Coils.

DL—25.....\$ 1.45	DL—300.....\$ 1.85
DL—35.....1.50	DL—400.....1.90
DL—50.....1.60	DL—500.....2.10
DL—75.....1.60	DL—600.....2.30
DL—100.....1.65	DL—750.....2.50
DL—150.....1.70	DL—1000.....2.75
DL—200.....1.75	DL—1250.....3.20
DL—250.....1.80	DL—1500.....3.70

Inductance Coil Mountings

Cat. No. LC-100. Geared Inductance Coil Mounting for panel mounting.....\$9.55

Cat. No. LC-101. Geared Inductance Coil Mounting on Oak Base and Pedestal.....12.75

Cat. No. LC-400—Inductance Coil Mounting for panel mounting, not geared.... 4.80

The above are all three coil mountings. Connection to the movable coils is made through heavy Litz wire, eliminating all trouble from loose connections.

Type F-500 Reversible Filament Rheostat \$1.75. Moulded of Condensite, Phosphor-Bronze Contact, complete with DeForest 1½-inch knob, for front or back mounting.

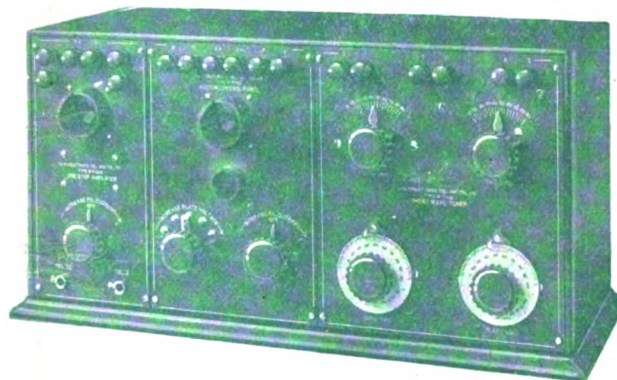
Type R-500 Reversible Tube Receptacle \$1.40. Moulded of Condensite, Phosphor-Bronze Contacts, low capacity losses, and minimum leakage.

Series Parallel Switch Type S-100..... 1.90

Variable "B" Battery Switch Type S-600 1.32

And for the best book on Radio, ask your dealer for "Elements of Radio-Telegraphy" by Lieut. Ellory W. Stone, U. S. N.

Combination Set Type No. MR-3



MP-100 Audion Control	\$ 14.30
MP-200 First-step Amplifier	18.80
MP-200 Second-step Amplifier	18.80
MT-100 Tuner	45.50
Cabinet	13.70

\$111.10

Panels also sold separately at above prices. Cabinets for any combination of panels.

A complete line of Radiophone transmitting and receiving equipment. If your dealer cannot supply you with DeForest Quality equipment do not accept a substitute. Write us direct. The results you get depend upon the equipment you use. Insist upon DeForest Quality equipment, the best that money can buy, at the price of ordinary equipment.

Write for Information.

Order from your Dealer, or direct from

Atlantic-Pacific Radio Supplies Company

638 Mission Street

Henry M. Shaw, President

San Francisco, California

National Distributors for Moorhead Laboratories, Inc., Mfrs. of A-P Tubes;
Sole Western Distributors for DeForest Radio Tel. & Tel. Co.—C.W. Transmitting
and Receiving Equipment. Shaw Insulator Co.—Molded Radio Supplies. Diamond
State Fibre Co.—Condensite Celeron. Redmanol Chemical Products Co.—Insulating
Varnishes and Lacquers.

CONTINENTAL NEWS

DECEMBER 1921

PUBLISHED EVERY MONTH IN "RADIO" BY THE CONTINENTAL RADIO AND ELECTRIC CORPORATION

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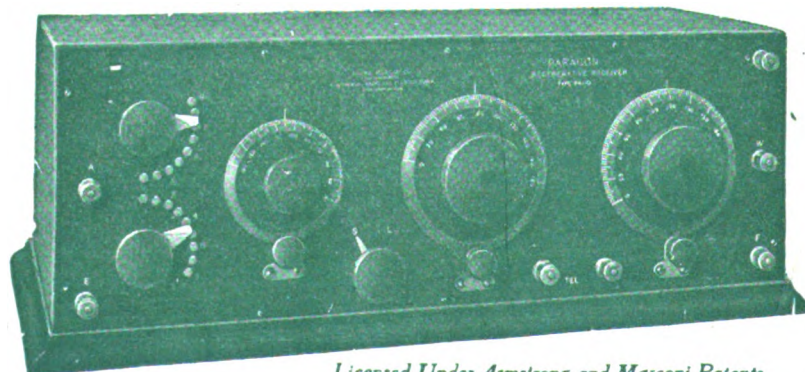
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